INSIDE: 3DS MAX • MAYA • BLENDER • MUDBOX • LIGHTWAVE • MODO

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3D Artist

51

Practical inspiration for the 3D community

Animate action
Master movement with our expert guide to tornado kicks

3D CLOTH EFFECTS
Learn to create your own soft furnishings

SKYFALL VFX
MPC & Cinesite discuss explosive effects

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Get creative with architecture to forge unique structures

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Understand the software and how to get the most from it

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EYE-CATCHING TEXTURE
Create your best-ever characters with our 7-page step-by-step tutorial

38 PAGES OF EXPERT TUITION
Bring fabrics to life • using Blender

Perfect details for • characters in Sculptris

Set up HDR lighting • for studio shots

DigitalEdition GreatDigitalMags.com ISSUE 051
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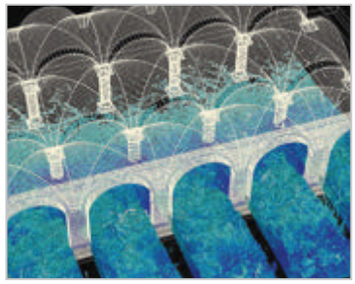
The fine art of 3D
Can Pekdemir reveals how he realises unique concepts in modo

modo Replicators
See how modo's unique tools can help you create stunning images



Flood with Houdini
Model simple scenes and apply shock-and-awe 3D destruction

Rhythm & Hues
The secrets behind *Life of Pi*'s super-realistic CGI revealed...

Image Courtesy of Daniel Bystedt
DO MORE, DO IT IN...
ZBRUSH 4R5®
Z4R5
Pixologic.com
ZClassroom.com
ZBrushCentral.com

Texture secrets unveiled

Page 54

Artist info

Luís Santos

Personal portfolio site
www.luissantos.net

Country Portugal

Software used LightWave, Mudbox, Photoshop, nDo2, Marmoset Toolbag

They say that the devil is in the details. In which case, this issue aims to kit you out with the tools and techniques you need to lasso that ol' devil and take your characters to some incredible new levels.

Luís Santos has a penchant for details. We're not talking the kind of level of detail that'll just do, but the type that stops you in your tracks as you peer at the cavernous pores of an elderly character's nose, or the veins in a tired man's bloodshot eyes. So when we were searching for someone to bring a stunningly detailed chameleon to life for our latest cover, Luís was perfect for the job. Find out his secrets on page 54.

> "I'll guide you through the creation of custom, organic stencils, which will enable you to sculpt rich and varied details for the skin"

Luís Santos shares his tips and tricks for perfectly unique characters. **Page 54**

With the Disc

Free trials and reader discounts:
- nDo2
- Marmoset Toolbag

Tutorial files:
- Marmoset scene files and maps
- Custom stencils
- Configurations for map extractions in Mudbox
- Tutorial screenshots

Welcome

to the magazine and 116 pages of amazing 3D

Every issue you can count on...

1. **116 pages of creative inspiration**
2. Behind-the-scenes guides to images and fantastic artwork
3. **A CD packed full of creative goodness**
4. Interviews with inspirational artists
5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

The 3D artist talent pool is huge. If you want to stand out from the crowd, you need to let your work speak for you.

To help you take your skills to the next level, this issue brings you a healthy selection of exclusively commissioned tutorials to give your work that extra oomph. Whether you want to improve your characters, bring arch-vis scenes to life or take your concepts to remarkable new heights, we have an expert on board to show you the tools and tricks that will lead the way. Our Workshop is also packed with extra guidance for animation projects, water simulation, demolition, cloth effects and lots more. Get stuck in!

Enjoy the issue,

Lynette

This issue's team of expert artists...

Michael Burns

Your 3D-printing news is brought to you by Michael, who has scoped out the best equipment, cool projects and top finds

Luís Santos

Our cover star reveals his workflow for LightWave and Mudbox, with a little Marmoset and nDo2 thrown in as a treat!

Sonia Foltarz

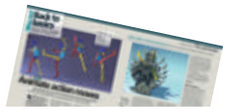
New to **3D Artist** magazine, Sonia swings by to create a fantasy concept for our 3D arch-vis artist to replicate in 3ds Max

Paweł Podwojewski

Paweł gets his skills put to the test in a step-by-step tutorial that challenges him to build an underwater structure... in ice!

Juraj Talcik

When we set out to discover a talented arch-vis artist using Marvelous Designer, we had no idea we'd find Juraj...



Jahirul Amin

We've bounced balls, learned to walk, tackled a jump... Jahirul takes it up a notch this issue with a tornado kick!

Gustav Melich

Our Houdini master has returned to wreak a little havoc. This issue he builds a scene to smash it up with an epic flood

Filippo Veniero

Our Blender guru gives ol' Suzanne a break this issue, covering her in pretty cloth, rather than dousing her with fire

Richard Yot

This modo genius teaches us the art of Replicators in a cute little guide that will help your illustrations to flourish!

Timur 'Taron' Baysal

It's exciting for us to work with artists that love the software they use. Taron's guide to Sculptris will win you over in no time!

Orestis Bastounis

Our hardware-savvy reviewer gets his mitts on Workstation Specialists' WSX6 to see if it gives artists top-end performance

Ross Board

We welcome Ross back this issue to check out the iClone Animation Pipeline bundle. He reveals what it has to offer

Sign up, share your art and chat to other artists at www.3dartistonline.com

3DArtist

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Contents 51

What's in the magazine and where

News features & reviews

8 The gallery
An inspiring collection of 3D illustrations from far and wide

16 Community news
Don't fall behind your peers: stay up-to-date with the latest projects

20 3D printing news
Scope out our exciting finds and tech updates in this fast-moving industry

22 Readers' gallery
The **3DArtist** readers strut their stuff in our community showcase

24 Have your say
Our readers share their work, air their views and chat to the team

26 The fine art of 3D
How Can Pekdemir creates unique sculptures with the help of modo

32 Filming the impossible
Rhythm & Hues and MPC comment on CG tigers and oceans in *Life of Pi*

38 *Skyfall* VFX
The Moving Picture Company and Cinesite reveal some 007 secrets

46 Know your VFX tools
Understand the software, what it does and who's using it

96 Subscribe today!
Save money and never miss an issue

98 Review: WSX6 workstation
Need a system that packs a punch? Check out this mighty beast...

99 Review: iClone Animation Pipeline software
Can Reallusion bring together mo-cap, pre-vis and animation?

54

Texture secrets

"This tutorial will take you through the entire process of modelling, sculpting, texturing and rendering a chameleon with a high level of detail"

Luis Santos leads a step-by-step tutorial for LightWave and Mudbox

110

62

Design and forge impressive structures in 3ds Max

32

Putting photorealistic CGI to the test...

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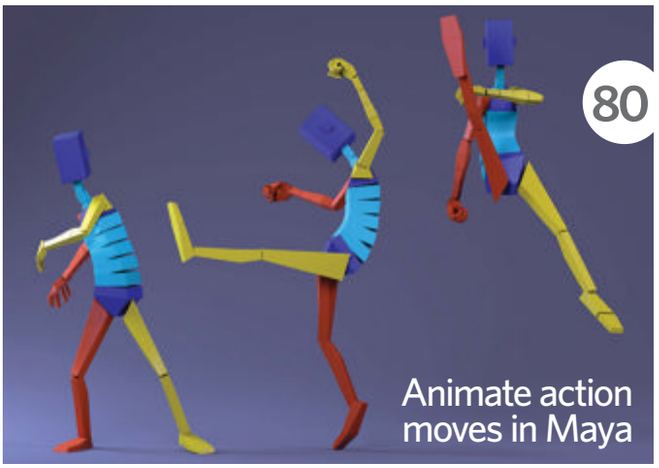
Turn to page 96 for details

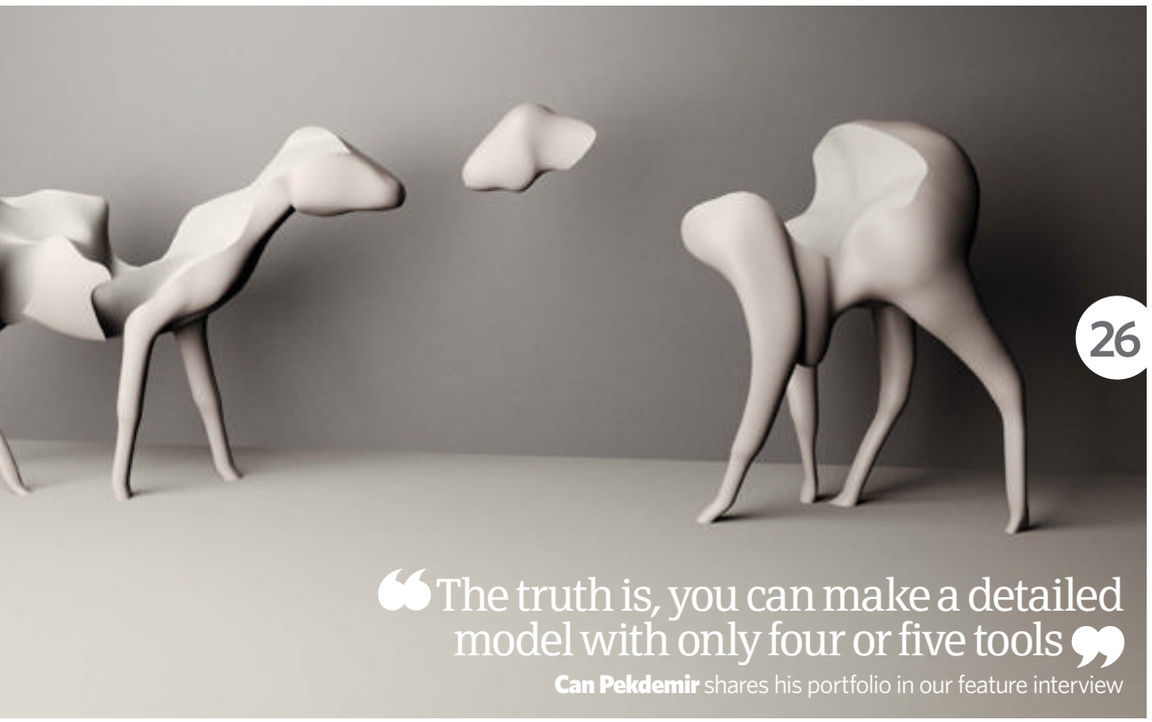
72

Discover the secret to perfect furnishings



80

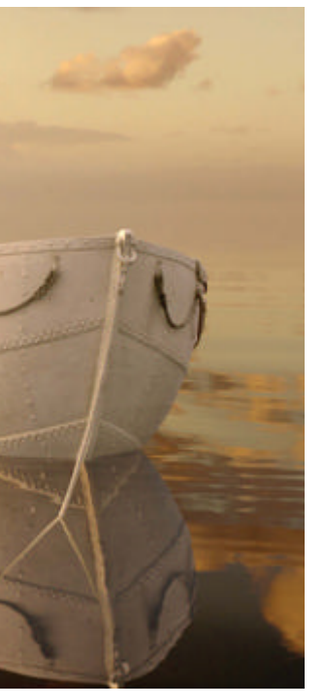
Animate action moves in Maya



26

“The truth is, you can make a detailed model with only four or five tools”

Can Pekdemir shares his portfolio in our feature interview



The workshop

Expert tuition to improve your skills

80 Back to basics: Animate action: the tornado kick
Jahirul Amin's expert tutorial teaches how to create a 540-degree action move

84 Masterclass: Flood scenes with Houdini
Gustav Melich's guide to building scenes and destroying them

88 Questions & answers
This section is for users who have some experience of 3D and want to learn more

Blender: Cloth simulation

modo: Replicator tips & tricks

Sculptris: Sculpting techniques

HDR Light Studio: Product shots

workspace

Industry news, career advice & more

102 Industry news
Get up to speed with events, updates and new releases

105 Course focus: Sculpting Techniques
Stan Winston School teaches the fine art of dynamic characters

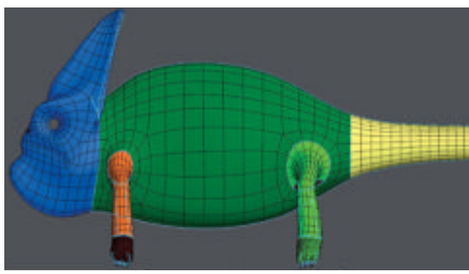
106 Project focus: 'Sang d'Encre'
Students at Bellecour Ecoles d'Art create a romantic short film inspired by poetry

108 Industry insider: Industrial designs
Halo 4 concept artist Chris Durso talks environments

The studio

Professional 3D advice, techniques and tutorials

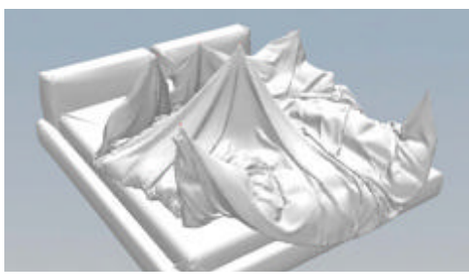
54 Step by step: Achieve eye-catching texture
Luis Santos uses LightWave and Mudbox for high-level details



62 Step by step: Fantasy arch vis in 3ds Max
Concept and build the fantastical with our expert guide

70 I made this: *Residential complex* by Studio Aiko
Go behind the scenes of this exceptional terraced complex

72 Step by step: 3D cloth effects for arch vis
Discover how Marvelous Designer can bring arch vis to life



With the Disc

- **iClone4 PRO full software**
- **Marvelous Designer 2 exclusive trial**
- **3 arch-vis interior models**
- **Digital-Tutors' video tuition**

Turn to page 112 for the complete list of the disc's contents

WELCOME TO

THE GALLERY

Seven pages of great artwork from the 3D community

Images we love!

Have an image you feel passionate about? Get your artwork featured in these pages

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The team Loves

This is such a powerful image! Despite it being an untextured render, Ruan Ji has created a fantastic illustration by lighting it perfectly to capture a mood and expressing the eye with a little colour. It brings life to the piece, completing a great addition to his portfolio

Lynette Deputy Editor

"I'm a huge fan of prehistoric animals – especially dinosaurs. Initially I wanted to make some space armour [but with] some elements of dinosaurs... I came across the idea of making something more mythical, rather than realistic **Ruan Ji,** *The Elder,* 2012

Artist info

Ruan Ji

Working at SEGA Australia, Ruan Ji creates photorealistic characters and creatures

Personal portfolio site http://darkmummy.cghub.com
Country Australia
Software used Maya, ZBrush, Photoshop, xNormal

Work in progress...

"The creation of this image was natural. I used ZBrush for modelling, texturing, lighting and rendering. I used Photoshop for colour correction and post-processing"

Tomasz Strzałkowski, *Mysterious Sculpture,* 2012

The team Loves

"The detail in this sculpture is remarkable! It truly feels like a relic with all those beautiful and intricate fossil-like crevices and textures. The tranquil colour palette helps portray the otherworldly creature as something very peaceful"

Lynette Deputy Editor

Artist info

Tomasz Strzałkowski

3DArtist online

Username: Tomstrzal

Personal portfolio site
www.tomstrzal.com

Country Poland

Software used
ZBrush, Photoshop

Work in progress...

“This creature is a Murloc – a clever and advanced hunter looking for a rare spider venom. I did this as a personal piece to test my skills after some time spent only on freelance jobs”
Robin Beneš, *Venom Hunter,* 2012

Artist info

Robin Beneš

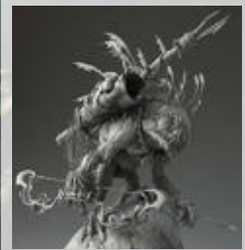
Robin has been in the videogame industry since 2003 as a level designer and 2D/3D senior artist

Personal portfolio site
www.tes3d.com

Country Czech Republic

Software used ZBrush, 3ds Max, mental ray, Photoshop, Hair Farm

Work in progress...



The team loves

“The detail on this sculpt is astonishing, from the dripping, sinuous muscles of the creature himself to the rocks and arachnids around him”
Chris News Editor

Artist info

Maciej Kuciara

This concept designer has recently worked on Naughty Dog's *The Last of Us* videogame

Personal portfolio site
www.maciejkuciara.com

Country USA

Software used
ZBrush, Photoshop

Work in progress...

The team Loves

We're *huge* fans of Maciej's 2D concepts, so when we saw that he was dabbling with ZBrush, we couldn't quite believe our luck! This character is solid and enigmatic. We love his baby blues!

Lynette Deputy Editor

"[I created this] Alien head concept to practise and learn the basics of sculpting and rendering passes in ZBrush, with the ultimate goal to use this software in film and videogame production. Having a 3D sculpt allows [you] to assess your design problem areas much quicker than with a standard 2D paint or sketch" **Maciej Kuciara,** *Alien,* 2012

Artist info

Diego Querol
Diego is an industrial designer and works for a studio called Idearideas Media Lab

Personal portfolio site
www.wix.com/diego3dq/3dqart

Country Spain

Software used
3ds Max, V-Ray, Photoshop

Work in progress...

The team Loves

"The best arch-vis projects feel unique and impart a real sense of atmosphere. This work has both of those qualities down to a T"

Chris News Editor

"I started this project during my year living in Amsterdam, working in my small room with a laptop and testing what I was learning day by day on it... When living back in Spain I decided to finish it. By making some changes to the furniture and also testing out some lighting and texturing effects, I got the result that you can see here"

Diego Querol, *Creative Coffee,* 2012

Artist info

Pascal Blanché

Art director at Ubisoft Montreal, one of the world's biggest videogame development studios

Personal portfolio site
www.3dluvr.com/pascalb
www.pascalblanche.cghub.com

Country Canada

Software used ZBrush, 3ds Max, Photoshop, V-Ray

The team Loves

"Looking at this image is like peering through a wall of formaldehyde at a creature once lost. Pascal's incredible concepts never fail to surprise us!"

Lynette Deputy Editor

"I wanted to re-create the atmosphere I [established] in another similar picture years ago to see what I could achieve with the new tools and techniques I've learned since then"

Pascal Blanché, *Hypersleep,* 2012

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Artist info

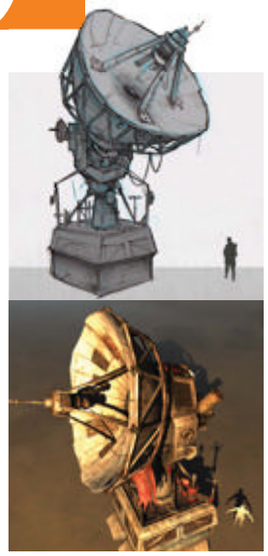
RenPeng Dong

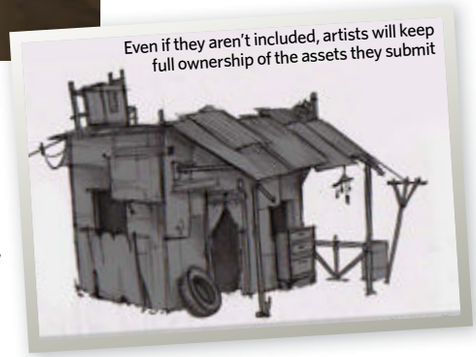
Personal portfolio site
www.oldrhyme.cgsociety.org
Country China
Software used
3ds Max, Maya, ZBrush, Mudbox, Photoshop, V-Ray

"I saw an image on a website that was like a kind of transparent man blending with his background, which brought me this great idea... [I] decided to show the feeling of part drying paint, part real, part plaster"

Non-US readers turn to page 96

Each asset package used in *Wasteland 2* will receive a special badge artists can apply to their asset in Unity's storefront, marking it out from the competition


"Ultimately, we will end up tweaking a prop here and there..." says Vanoteghem


Even if they aren't included, artists will keep full ownership of the assets they submit

Crowdsourcing models in Unity

inXile looks to its fans to create assets for its upcoming Unity-powered title

***Wasteland 2* is turning out to be an interesting project indeed.** Not only was it one of the first of a new wave of videogames funded via Kickstarter ($2,933,252 of a $900,000 goal), but developer inXile entertainment has now also reached out to the 3D community to actually help create the game.

The unique crowdsourcing experiment has seen inXile partner with engine-developer Unity, posting concept art up on the *Wasteland* website and asking the community to turn it into 3D models for use in the game itself and for sale on the Unity Asset Store.

> "The vast majority of our fans love the idea of continued involvement and feel like this project is as much theirs as ours"
>
> **Koy Vanoteghem,** inXile environment artist

"*Wasteland 2* was a crowdsourcing experiment from the very beginning, starting with the Kickstarter campaign and continuing with our efforts to connect with our backers, to obtain feedback on the things we were thinking about and developing," says Koy Vanoteghem, environment artist at inXile. "Extending that concept to the production side of things was an idea that evolved pretty quickly."

If a model is selected for use in *Wasteland 2*, the artist will be paid and credited in the game. "Contributors that have their packages selected as part of this process maintain complete control over their property," says Vanoteghem. "InXile is the first purchaser in what we hope is the beginning of a sustainable revenue model for those that are interested in that component.

"For those who submit but don't have their packages selected, they also maintain complete control over their property and, of course, are able to sell their assets on the store," he adds. "The opportunity to participate in the process in and of itself is an educational experience that's worthwhile. Whether you're a student new to the field or a fan that's thinking about getting into the business of game production, [it's] an opportunity to learn... what is involved."

The team is proud of the experiment and is looking to expand the strategy in the future. "Our greatest gain from this is a much stronger connection to our target audience and our... backer community," says Vanoteghem. "We continue to be amazed by the level of enthusiasm and support. The vast majority of our fans love the idea of continued involvement and feel like this project is as much theirs as ours. Failure or success aside, this experiment has been great for us in our effort to get more involvement from the community." Read our full interview at http://tinyurl.com/3DAWasteland2.

The future is now

We asked Vanoteghem if this experiment could only have been achieved with today's technological advances. He replies:

"It's difficult to imagine an earlier time when this could have played out the way it did. However, I don't want to overstate the importance or impact this endeavour has had on our production, or will have on the industry... We're really just breaking into this kind of approach in game development. That said, I am not sure that in the past it would have been possible to reach so many people around the globe, to communicate with them and have them participate so quickly and effectively. It's amazing, really, and I won't hesitate to say it's damn cool to be a part of!"

Encouraging concepts

Vanoteghem talks about the artistic requirements – or lack of them – for the daring experiment

"Very few limitations were laid out for the participants – and quite intentionally so. By providing just a loose thumbnail concept and a few small notes on tri-counts and map sizes, our hope was to encourage creativity and imagination in the artists involved.

"The freedom to work in a way that the artists are already comfortable and successful with seemed paramount, given our rapid turnaround time and the knowledge that many contributors would be doing this in their spare time.

"The biggest requirement that we did set forth was that artists use their imagination. I know that probably sounds stupid, but honestly the last thing we wanted was for a contributor to submit a model that exactly reflected the initial concept. We wanted to plant a seed in the mind of the artist as to what the prop was supposed to do and provide guidelines as to its scale and scope. Outside that, we wanted to be surprised."

"The creativity of the contributor should mimic that of a *Wasteland* inhabitant," says Vanoteghem

Tedeschi uses 3ds Max, Maya, ZBrush and Photoshop, but says he still has to learn new tools for projects, so playing with the most up-to-date software and features is key

"Don't get stuck doing the things you hate just for the sake of being in the 3D industry," advises Tedeschi

Artist spotlight

Living the dream

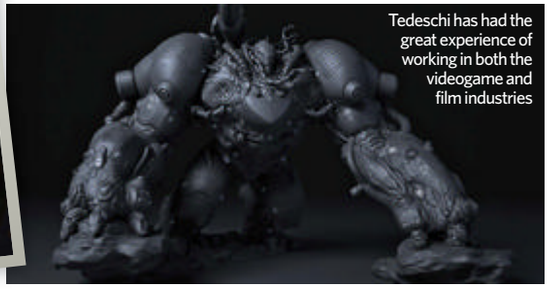
We speak to Furio Tedeschi about working with Guillermo del Toro and 343 Industries

Furio Tedeschi www.furio.carbonmade.com

Although born in Italy, Furio Tedeschi was brought up in South Africa. Art was always an outlet for him and inspiration was abundant. "My mum having a love for all things Asian and my dad's love of war miniatures made for an interesting childhood, and I loved the Frazetta paintings up on the walls," he says.

Tedeschi's career since then has been interesting indeed; a mixed bag of everything from creating adverts to working on weapon simulations for a military facility. "Most projects have been exciting for many reasons. However, the one that comes to mind was working with Guillermo del Toro on *Pacific Rim*," says Tedeschi. "I was surrounded by guys who I considered to be demigods, like Francisco Ruiz, Wayne Barlowe, Allen Williams and TyRuben Ellingson, [and discovered] how down-to-earth, cool and approachable they are... "

Tedeschi has also recently worked on *Halo 4* with 343 Industries, where he had the opportunity to sculpt and model the enemy Hunter character as well as various other background characters. "Seeing the Hunter come to life in the *Halo* live-action short film was wicked," beams Tedeschi. "Big thanks to the guys at 343!"



Tedeschi has had the great experience of working in both the videogame and film industries

3D Sketchbook

Epic sci-fi doors

343 Industries artist Paul Pepera discusses creating engaging sci-fi doorways

Paul Pepera www.peperaart.com

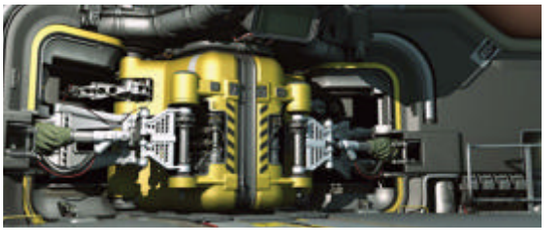
Building door designs may not seem like the most-exciting part of sci-fi content creation, but it's nevertheless a challenging aspect of the genre. "Striking the proper balance of implied functionality and sci-fi whimsy is what creates a pleasing and memorable design..." says Pepera. "I wanted these doors to be fun to look at. I wanted to reward further investigation by the viewer, by having functional-looking details."

For reference, Pepera heavily used landing-gear designs for the arms controlling the doors. "I also looked at submarine watertight doors, bank vaults and safes. I always reference the real world to ensure my designs remain visually functional."

To create these doors, Pepera used 3ds Max, ZBrush and Photoshop. "Once I have sketched out a design I think will be compelling, I typically start at the core focus of the piece and work my way out," he says. "For the doors, the core areas were the [mechanisms] that control the operation of the devices, such as the articulating arms and joints. These are the visual hooks of the door and ultimately they decide if the designs are successful or not."

To read the full interview with Pepera, head to http://tinyurl.com/3DAPaulPepera.

Pepera says finding the balance between utility and fictional fantasy is the difficult part of the process



Top tips for great entrances

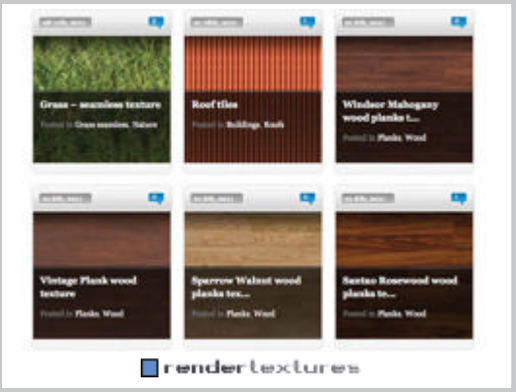
"I often render out the model during all stages of the process so I can keep track of progress. Once enough is modelled, I can zoom out and analyse the design as a whole, see if it's properly balanced and if the forms are reading correctly. I'll start kit-bashing parts together once enough pieces are modelled to create unique-looking areas out of pre-existing components. This speeds up the modelling process."

Free 3D Resources

Free textures

Browse through a broad variety of free textures, ideal for a variety of 3D and arch-vis projects

Web: www.rendertextures.com

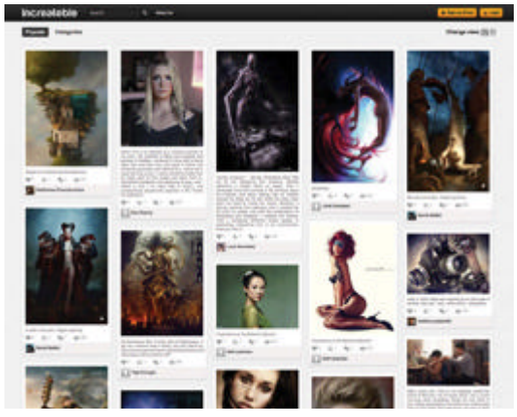


RenderTextures.com is a free database offering a wide variety of textures for many of your 3D projects. The site offers categories of bricks, buildings, concrete, effects, fabric, ground, nature, rock, water and wood, with many sub-categories within each. A lot of the textures also come with a selection of Diffuse, Bump, Normal and Displacement maps. A useful selection of tags and a Related Textures section might also lead you to some assets you might otherwise have missed. Simply put, it's the perfect, free resource for your arch-vis needs!

Increateble launches

New website looks to promote only the best and most-impressive artwork

A new art blog named Increateble has launched as a place for artists to share their ideas, gain experience and improve their skills. The difference with Increateble is that it's a closed community, meaning you can only become a registered author by receiving an invitation from someone who already holds that status. The main mission of the site is to "unite talented and creative people from all over the world, to create a stable community as well as promote and develop graphic and web-design industries". You can visit the site at **http://increateble.com**.



behind the scenes

Realistic sci-fi

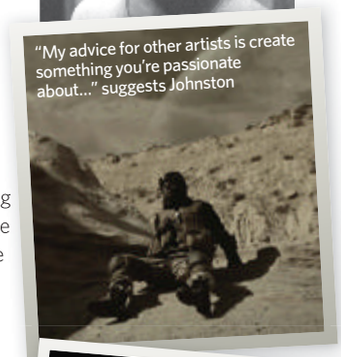
We talk to Tyson Wade Johnston about his new short film project, 'SEED'

Tyson Wade Johnston www.tysonwadejohnston.org

Tyson Wade Johnston's minimal sci-fi short, 'SEED', is a compelling tale set on a planet named Gaia, where an isolated mercenary discovers some truly unearthly horrors. "The goal was to create something entirely different from what filmmakers produce today," says Johnston.

The 3D models for the short were created in Maya by Precog Studios and were composited solely by Johnston. "The footage was entirely handheld with no tracking points, so software like Boujou and mocha came in handy..." he explains.

The biggest challenge for Johnston was creating an entirely alien world that still seemed natural. "Nothing was glossy... [So] I hid everything behind thick, atmospheric layers of haze. I didn't want viewers to be taken out of the world at all, so I really focused on making the foreign elements feel as earthly as they could." See the short at http://tinyurl.com/SEED3DA.


"My advice for other artists is create something you're passionate about..." suggests Johnston

For Johnston, realism is key to great CGI. He believes you should always consider how a CG effect would look if you were filming it for real

inspiration corner

Great things, small packages

A theme park that could sit in the palm of your hands

Romeu & Julieta Estúdio www.romeuejulieta.net

When Brazilian design studio Romeu & Julieta Estúdio was approached to create a piece of work illustrating an aquatic theme park being built in Santa Maria, the team knew they would have to get creative. "We were to create our own theme park, based on the structural design, themes, decoration and landscaping of the actual location," says Jean Campos, creative director of Romeu & Julieta Estúdio. "Disney World was our main reference. The client wanted to capture the magic and grandeur of that enterprise, and I think we got close."

The team worked with several tools for the creation of the piece, but didn't use any retopology tools. "We exported the real mesh into 3ds Max," says Campos. "We also used 3ds Max to assemble the scene, distribute vegetation and apply shaders and lighting – it's a very powerful tool when working on big projects."

The end file contained more than 18,000 pixels and as such had to be divided into blocks of interest. "It was impossible to carry everything in a single file," says Campos. "We spent a lot of time optimising using Smart Objects in Photoshop, which gave us the opportunity to isolate elements and load them dynamically in the file array."

For the grass, the team used a Substance map, which simulates repetitive patterns of textures, such as roofs, sidewalks and grass

Be inspired.

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The key features dissected
The apps you'll want to use
How it compares to iPad 4
6 iOS 6 secrets
Better photos the Apple way
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And 24 more of your Mac questions ans
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From ZBrush to wooden figurine...

How Ben Leitgeb's maple-wood sculptures began life in digital clay

Leitgeb, who trades at www.ben-godi.com, uses a 3D-printed reference template for a pantograph 3D-profiling machine and wood mill. The process was developed with Italian wood carvers 3D Wood (www.3dwood.com) – but it all starts in ZBrush.

"ZBrush allows me to create and sculpt the model entirely on the computer," explains Leitgeb. "When I'm done with the sculpting, I apply the Decimation Master plug-in and reduce the polycount. I export the geometry as an STL file with the 3D Print Exporter plug-in and use Magics RP from Materialise (www.materialise.com) to combine all the shells to one and to fix mesh errors."

Leitgeb looks to Shapeways for printing, using a sandstone material for all prototype models and a very strong nylon/plastic, laser-sintered material to make the double-sized reference model. "I fill the plastic 3D printout with a special resin and mount it on a metal plate," explains Leitgeb. "The tracing itself isn't an automated process yet; you still have to do it by hand."

Ben Leitgeb's work is part of a renaissance of wood sculpting being driven by 3D printing

© Benjamin Leitgeb

Revolutionary sculpture

Joshua Harker's latest Kickstarter-funded artwork, Anatomica di Revolutis

The piece broadly represents a revolution driven by the web, 3D printing and crowd funding

© Joshua Harker

With components crafted from 3D-printed polyamide, this three-part sculpture is designed to assemble together to represent Harker's vision of the developing '3rd Industrial Revolution'. The wings are comprised of 75 separate mechanical moving pieces that are printed in their entirety as a single working assembly.

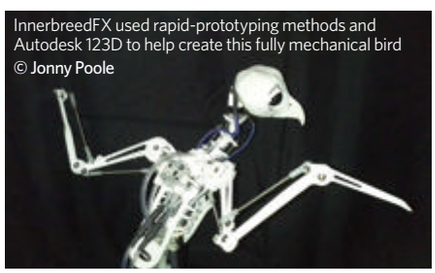
Harker has used a variety of software, including SolidWorks for mechanical engineering, ZBrush for organic forms, and Blender and 3ds Max for box modelling. Harker says reaction to the project has been "ecstatic to say the least. [Kickstarter] has proven to be a productive venue for me." Find out more about his Kickstarter campaign: http://tinyurl.com/anatomica.

Animatronic skeletons

InnerbreedFX creates an animatronic 3D-printed bird

Jonny Poole used Autodesk 123D to design the components of the mechanical bird armature and the Shapeways service for rapid prototyping. "I had to experiment with different designs and also materials," says Poole. "Once I had a few prototype parts printed I could figure out the best way to design the final components."

Poole used PA 2200 white plastic material for the project. "It's a very strong material but also very light," he adds. "The next stage is to hand it over to a taxidermist..." Poole explains. Find out more at www.innerbreed.co.uk.



InnerbreedFX used rapid-prototyping methods and Autodesk 123D to help create this fully mechanical bird

© Jonny Poole

Objet claims the Objet1000 is ideal for printing very large as well as finely detailed 3D models

The pre-merger monster printer

Objet has launched its largest 3D printer to-date

The Objet1000 is a wide-format model for rapidly creating industrial-sized models and 1:1 scale prototypes. Launched at Euromold, it's the largest 3D printer from Objet yet, featuring an ultra-large build tray sized at 1,000 x 800 x 500mm. It combines a large-build platform with precision inkjet 3D printing and Objet's Connex multi-material capability. It can print up to 14 different material properties within a single model. In other news, Objet has completed a merger with Stratasys, Inc; the combined companies will now be trading as Stratasys Ltd.

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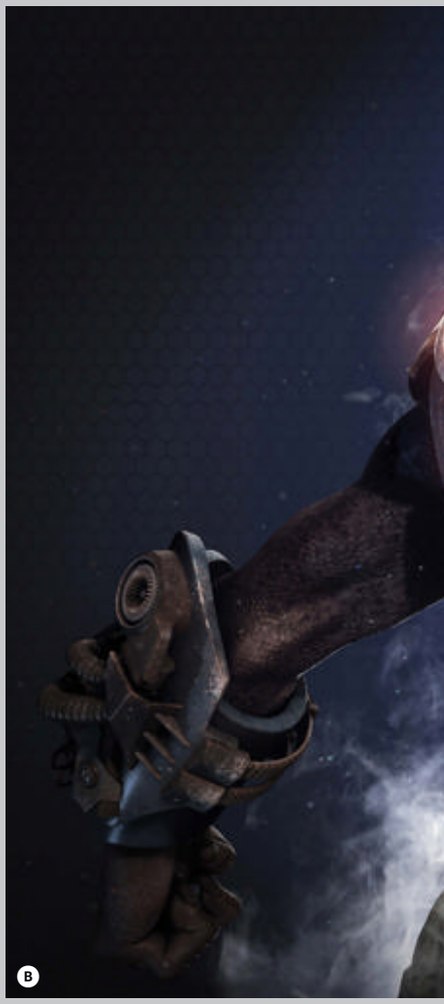

Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

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3DArtistonline.com
www.3dartistonline.com
to view the art and chat to the artists

A Remember Zhang Jia Jie
» **Angel Alonso**
3DA username angelitoon
Angel says: "I made this to test different matte-painting techniques and 3D camera projection. I modelled the rocks in Organica and added detail in ZBrush to give scale to the scene. I made a different render of the trees and multiplied them in 3ds Max."
We say: *Now this just makes us want to pack a bag, get our hiking boots on and go exploring! An incredible effort – and great to see Organica being used.*

B Time to Fight
» **Manu Herrador**
3DA username mherrador
Manu says: "I designed this character for a personal sci-fi project. I was inspired by the skin and the anatomy of a lizard to get a reptilian appearance. It was made with 3ds Max for modelling, V-Ray for rendering, ZBrush and Photoshop for texturing and finally Photoshop for post-production effects."
We say: *This is epic! Although he's in a fairly symmetrical pose, the final presentation cleverly adds drama and excitement through smoke effects and a textured background. The lighting is spot on!*

C Roces House
» **Patric Verstraete**
3DA username Vizcon
Patric says: "The Belgian Govaert & Vanhoutte Architects' project 'Villa Roces' in Bruges (Belgium) was awarded the LEAF Award 2012: Residential Building of the Year (single occupancy). I was so overwhelmed by such a minimal design that I decided to model the house."
We say: *The lighting is absolutely stunning. By creating a strong composition with foliage, while framing the shot thoughtfully to give depth and intrigue, Patric has made a simple design extremely exciting!*

D Fruit Friends
» **Erik Hellmouth**
3DA username erikhellmouth
Erik says: "I wanted to create a crisp image to symbolise the beauty of relationships. I have always liked images with a surrealistic approach. I used Maya, V-Ray and Photoshop."
We say: *This is so different we couldn't not feature it as an image of the week! It's vibrant, fun and mouthwatering. The excellent textures and water effects really bring this minimal composition to life.*

Image of the month

Assault Droid Tank Concept

» **Simon Cheng**

3DA username Simon Cheng

Simon says: "I always wanted to design a droid base and unique body panel for a battle tank. The body panel is not just unique in shape but it's also able to digitally camouflage on the battlefield, which is really cool!"

We say: *It's great to see 3D being used to flesh out concept designs for vehicles. The idea behind this is really interesting – it would be good to see it in a location shot too, to see how the camo works.*

Hookahtime

» **Nuttavut Baiphowongse**

3DA username Gibbon

Nuttavut says: "This piece started from an experiment combining a frog, nepenthes, yoga and a hookah... I am happy with the outcome."

We say: *It wouldn't be a gallery without a monster of some description. When we spotted this smoking alien with his pipe and freaky lips, we couldn't help but share it!*

Donker

» **Timour Ozdoyev**

3DA username toivo

Timour says: "A Donkervoort d8 GT classic studio render, made in 3ds Max and V-Ray"

We say: *We imagine you'd be able to hear this slick machine coming from a mile off – that engine space is huge! Timour has kept things simple with a classic perspective and studio lighting to show off this beast of a sports car.*

Workshop

» **Vladimir Kuzmin**

3DA username Vladimir Kuzmin

Vladimir says: "[This] is a personal project... 3ds Max and Maxwell Render were used in the creation of this work"

We say: *This scene deserves a mention this issue for managing to capture the clutter of an artist's studio in such a compelling way. We feel like putting our feet up and ditching the computer for a paintbrush!*

Have your say

Email, tweet or get in touch with us on Facebook to share your thoughts, opinions and proudest projects

Top tweets

Get involved... @3DArtist

@AimForSabir Delighted with the free @GameTxtures in [issue 50] @3DArtist! Worth the price of a year's subscription alone! #gameart

@jonjakesg @3DArtist you keep me company whenever I need inspiration

@TingleDingle @3DArtist getting ready for a character-modelling class!

@StopMotionMan Great new issue of @3DArtist out today. Congrats on hitting 50 issues! Thanks for the awesome Vue tutorial, freebies and for printing my Tweet!

@mographcandy @3DArtist Congrats! Every issue continues to deliver great content

@Nathan3DWilkes @3DArtist Happy Birthday 3D Artist! I still remember my mom buying my first issue!

On the Wall

Facebook.com/ 3DArtistMagazine

Connor Thomas I love the magazine, but as a suggestion, it would be great to see a page or an article for student 3D artists. The mag is great for showcasing people that are already in the industry, but I think there are some [talented students] out there that just need the chance to show people what they are capable of. There are not many 3D magazines that include students, maybe 3D Artist could make a great example. Thanks, love the mag.

digital-tutors www.digital-tutors.com is a learning-resource site boasting a library of 17,000 video-based CG lessons

THE AUTHOR OF THIS ISSUE'S STAR LETTER WINS A MONTH'S FREE SUBSCRIPTION TO DIGITAL-TUTORS WORTH $45

Star letter

Great tutorials, but...

Hello there. I've been a reader of your magazine for some time now and it's been productive reading, since you offer a global approach of the 3D universe. I like especially the articles about some studios and their work, [whether] on cinema or arch vis, animation [and so on].

But despite my positive appreciation there's one aspect I'm not fully satisfied with: the way some tutorials are written. I'll explain my idea below. Some tutorials show a bunch of general techniques that are, in some ways, known to the common 3D software user. For example, I love ZBrush, so when I see written in a tutorial: 'with the Clay brush build the form and with the Dam Standard go into the details', it doesn't mean anything. And why is that? Because the author is only mentioning the tools, which are sometimes kind of obvious.

What the reader wants to read... are those tips that come from practise, which will help a lot in our work in terms of time and productivity... When I see your cover and/or tutorials and I read 'learn how to create this amazing image', I get all psyched. But when the tutorial is the enumerations of the tools used, it's simply not enough. We want the inside tips from the professionals that know their way around.

To finish I would like to ask you for a specific tutorial. When reading some tutorials I read a lot of this kind of sentence: 'I took the ZBrush piece into 3ds Max/Maya and did the retopology'... What's the best way for retopologising a ZBrush piece in 3ds Max? Please, help me on that!

That's all. Keep up the good work.

Ângelo, by email

Every artist works differently and each has their own way of explaining a workflow. José Alves da Silva, for example (featured in issue 43, here), writes thorough tutorials that keep artists from feeling lost

What a fantastic letter – thank you! This is exactly the kind of feedback we need. We'll of course try to encourage our tutorial authors to talk more about their insider tips and techniques. It does always feel like a revelation when we get those golden nuggets, we admit!

We'll also get the retopology question lined up for a future issue for you, thanks for your suggestion. Keep an eye on the Q&A section in the near-future.

As our Star Letter winner, you've grabbed yourself one-month's subscription to Digital-Tutors, worth $45 US – or priceless if you consider the amount of learning you can do in that time! Please keep in touch with feedback and suggestions. We very much welcome other readers to let us know what they think, too!

How long should I wait?

Well, sadly, I've been trying to get this issue here in the U.S. and Barnes & Noble still can only offer me issue #48... What's the problem with B&N stocking this publication in a timely fashion?

Jeremy Schmidt, on Facebook

Hi Jeremy! It usually takes around 4-6 weeks for international stockists to get a new issue on the shelves, so you'll generally be a month behind. Pretty crazy, we know, but we do keep this in mind when creating the magazine so our international readers don't miss out on the good stuff. If you subscribe, you'll get the issues posted to you as they're released, so that's the best way to get the mag in a timely fashion: ***www.imaginesubs.co.uk****. Hope this helps!*

Issue 48 reveals the secrets artists use to create photorealistic nature, while Weta Workshop's Andrew Baker teaches ZBrush tricks in issue 49

Giles used DynaMesh and Transpose Master in ZBrush 4R4 to master these impressive sculpts. Each one started life as a ZSphere, before being shaped with the SnakeHook and Inflat brushes

Aspiring artist

Hello there! My name is Giles Ruscoe, 19, and I'm a character artist studying Creative Computer Games Design at Swansea Metropolitan University. I've been doing character art for around three years now and it's a growing passion of mine. I've just started my second year of university and I am looking to specialise in character art as a career once I graduate. I'd like to share some of my recent work with you in the hope of getting a piece into your fantastic magazine! They are both going to be part of a new section of my portfolio based around conceptual sculpting, which you [can] find in a month or so at www.artofgiles.com.

Giles Ruscoe, by email

Thanks for sharing your work with us, Giles. These are impressive – we're sure you'll get snapped up after graduation if you maintain this quality. Don't forget ZBrush 4R5 is out now with a host of new features to improve your sculpting workflow. Keep up the awesome work!

Thanks, Mr Postman!

Got my new issue today, too bad the postman destroyed the disc.

Shawn Roelofsen, on Twitter

Yikes, sorry to see this – what a mess! If ever you have any problems with your disc, or it becomes lost, damaged or broken, you can write to our friendly disc team at 3daxtrahelp@imagine-publishing.co.uk with your problems and they'll do their very best to sort you out with a replacement disc.

You tell us

Happy New Year, everyone! Are there any 3D-related New Year's resolutions being made out there? Share 'em with us – maybe we can help

Facebook.com/3DArtistMagazine

Klaire Hodgson: New Year's resolution is to be a BOSS at particle flow!

John Fout: Resolve to learn all the little nooks and crannies of 3ds Max I don't know about and dig my feet deeper into the media/entertainment sand, hopefully shifting from an engineering job to a more creative one. Focus on modelling, rigging and animation.

Josh Radle: To get my foot in the door at a studio!

Aly White: Improve my skills and gain more industry/studio experience. After my work experience last year I am eager for more. There's nothing quite like being around the professionals to spur you on [and improve].

Chris Jacques: To really sit down and concentrate on 3D! modo and ZBrush. I think 3D modelling presents the greatest artistic potential and will get even better when colour 3D printing becomes high-res.

Taylor Hasting: Figure out Houdini fracturing!

Daniel Poschinger: To somehow get ZBrush and then practise, practise, practise aaaand practise more!

Steve Reeves: To produce more artwork! I need to output more to get better! I'm just sooooo slow!

JOIN THE DISCUSSION: Facebook.com/3DArtistMagazine @3DArtist on Twitter

@3DArtist

@SN14 My goal is to get good enough to start a portfolio by the end of this year.

@danmoore3d Find a company that gives juniors a chance!

@liamkirkman Need to make sure I put together a good showreel.

@Azhreicb New Year's resolution... Just keep trying. Your best gets better each time you try!

Whatever your goals, **3D Artist** is there for you! If you've missed an issue, head to the Imagine Shop (**www.imagineshop.co.uk**) to pick up back issues, or go to GreatDigitalMags.com for digital versions – which never run out!

The fine art of 3D

> How would we look if we turned into boneless structures in a second, or if the gravity on Earth was different?

All images © Can Pekdemir

THE FINE ART OF 3D

Words: **Angelica Jopson**

Turkish artist Can Pekdemir uses unique methods to blend photographs, sculpture and 3D with challenging and meaningful results. We find out how

ARTIST PROFILE

Name Can Pekdemir
Job title Artist
Location Istanbul, Turkey
Website www.antrepo.org
Expertise 3D sculpting and compositing with a focus on deformation and the abstraction of body forms

KEY EVENTS

2011 Exhibited in 'Christmas Strangers', a group exhibition in Barcelona
2010 Exhibited in the 'Lives and Works' exhibition in Istanbul
2009 His cat, Kaju gave birth
2008 Began working at the Department of Visual Communication Design at Bilgi University, Instanbul
2008 He made the bold decision to quit working for agencies

Within Can Pekdemir's world, bones disappear from faces while whales are dropped from great heights, deforming beautifully at the shock of landing. On first discovering his work, you can't help but take notice of the oddly incredible works that Pekdemir presents, while on further investigation you'll be glad that you wanted to know more. Though Pekdemir's images are seamless and bizarrely natural, his execution is calculated. Nothing is done without reason, so should you spy melting bovine hind legs among his breathtaking portfolio of artwork, you can rest assured that there's a very good explanation.

Pekdemir was born in Istanbul in 1982 and he is still based in the hustle and bustle of the city. In 2008 he took the leap of faith that so many fine artists wish they could bring themselves to take: he quit working for agencies altogether.

Swapping creative, corporate projects for a new environment where ideas and learning take centre stage, his move paid off. Pekdemir went to work at Istanbul Bigli University as a full-time instructor at the Department of Visual Communication Design. Here he feels the benefit and influence of working with people from different disciplines, giving him an excellent grounding to start introducing justification into his work. "Working in a school [provided me with the] great advantage of being able to reach both theoretical sources and technical equipment at the same time," he explains.

Theory and methodology are an imperative part of Pekdemir's approach to his art. While he's stepped away from academia for the moment to focus on his work, his academic experiences still inform a lot of his creative decisions. Pigs *can* fly in Pekdemir's world and when they do, he ensures they fly with great artistic merit.

LEARNING 3D FOR ART

3D is the tool of Pekdemir's trade, using programs such as modo and ZBrush to bring his ideas to life. "I've been into 3D for around 15 years," Pekdemir offers. But his interest in computer graphics stretches right back to the demo-scene time when real-time 3D graphics were created by code. He later moved to using 3D software to create artistic forms. "For the last four or five years I've been using it not only to form shapes but as a platform for deforming them – sometimes by misusing tools, letting mistakes happen as I work and doing methodological pieces," he says.

Digital 3D is a fascinating medium to work with, because it's very nature can be misleading. "Even though we work in a 3D environment on our computer screens, it is actually a two-dimensional representation of a three-dimensional space," Pekdemir explains. "Although we deal with all angles of a model, most of the time we end up with a two-dimensional image looking from a specific angle." Because of this, the artist ultimately chooses for the viewer which side of the multifaceted creation should be observed. "With a real sculpture, the viewer has the freedom to control his or her point of view and walk around the work. In 2D images [this is limited by] the decisions of the artist," he adds.

EXPERT TIPS

Can Pekdemir relies heavily on modo to deform and distort his sculptures. Here he shares his insights into this powerful program:

"The most important thing about modo, for me, is the Preview window, where I can get instant feedback for the final render while I make changes in the scene," he begins. "I also find the user interface very easy to work with and a breeze to navigate. Most people who want to start using 3D software are afraid of the complex interfaces they're presented with – there are just too many menus and buttons. A common misconception is that you have to learn every tool and property a program has in order to use it, but the truth is you can make a detailed model with only four or five tools. I suggest focusing on the final model or scene you have in mind, then learn by exploring and by making mistakes as you try out new tools. My favourite techniques include using procedurals as displacement maps for the deformation of a base form. I've also found it useful to utilise fur materials and create an entire mesh from them, rather than creating fur directly on a body. With modo 601, I started making use of joints to pose my models and frequently used soft-body dynamics to create the deformation. Shadow Catcher is another vital tool I use to composite my models onto photographs."

The fine art of 3D

7 SCULPTURES EXPLAINED

Using the invisible numbers all around us, a project spanning seven continents was created. Here's the technical bit behind it:

Pekdemir's project, '7 Sculptures', concerns the deformation and abstraction of the human body with a methodology that uses the invisible numbers around us as input. The result is time-and-location-based virtual sculptures. The project is made up of seven images, each one representing a continent around the world. Each model is composited into a photograph from somewhere on a particular continent.

"I composited these models [into] photographs because [a] photograph itself is a time- and location-dependent medium," Pekdemir explains. "This data is so commonplace that digital photographs store location and time information on each and every file and embed it into their file info." Major parameters for the deformation input included: Date/Time (D/M/Y and H:M:S) and Location (Longitude/Latitude) data. These numbers were used to create unique algorithmic 2D images (also known as procedurals) to be used as a displacement method. "The result was also a surprise for me," Pekdemir adds. "Since I [included] photographs that weren't intended to be used for this project." Some of these photographs were sourced and used with the permission of their owners.

The naming of each work is based on a formula: the first two letters of the continent + LongitudeLatitude + HourMinuteSecond + DayMonthYear + The first letters of the owner of the photograph. For the image named *af.1834.28022010.155359.as*, the data used to create the procedural was:

Continent: Africa
Lo/La: 18/-34
Time: 15:53:59
Date: 28/02/2010

DEFINING METHODOLOGY

3D may be Pekdemir's method of choice, but the artistic decisions and theoretical nuances that form the final piece mean that his work takes on a three-dimensional quality quite separate from what a software package can offer. "I joined an exhibition in Istanbul's 2010 European Culture Conference," he explains. "At the time I was interested in the semiologic analysis of facial movements. I decided to analyse how a news speaker's face moves and changes during different kinds of news titles, like politics and sports. By 2D-tracking the eyes and mouth visually, and using the audio form as a different visual element, I was then able to visualise this data and draw alternative news-speaker portraits. Following this, I continued working on methods to deform anatomy."

While his ideas have developed and refined over time, Pekdemir points to a single statement that had a great impact on how he approaches his work: "Once I was reading an article titled 'Art Common Sense and Photography' by Victor Burgin, who is a British conceptual artist," he begins. "I found this sentence in the article: 'There is no content without a form and no form which does not shape content'." Reading this made him revise his old work and try to analyse the decisions he had made throughout the creative process. After some analysis, the decisions and justifications of his work became a bigger part of the final outcome. "At the beginning of the 'Procedurals' series I made, I composited models into photographs by deforming the 3D shape affected by objects in the environment, or by placing them in deserted areas where no living thing is seen. These decisions were made very personally," he offers.

The North American image in the '7 Sculptures' series. This form was created from the data produced at the time the image was captured

> "There is no content without a form and no form which does not shape content"

Pekdemir's '7 Sculptures' series is perhaps one of his most methodological, linking concepts with images in both surprising and meaningful ways. "In the '7 Sculptures' series, I tried to connect sculpture and photographs by using the time and location numerical data of the photographs, to control algorithmic image parameters," he says. "This meant using specific numbers as input data to create a procedural in modo. This results in a unique virtual sculpture to be (de)formed for every location and time."

The fine art of 3D

> Pigs *can* fly in Pekdemir's world and when they do, he ensures they fly with great artistic merit

Pekdemir approaches his art by posing himself hypothetical questions and concepting the possible answers

Re-imagining reality enables Pekdemir to morph and distort images according to new parameters that he sets for himself

This image from the 'Soft Body' series explores the deformation of anatomy which acts like a cloth, or even a boneless form

WEATHERING THE CREATIVE PROCESS

To begin any work of art is a tremendous act of violence, if the Bohemian-Austrian poet Rainer Maria Rilke is to be believed. In Pekdemir's creative process, he finds the hardest part comes just one step before, while the final image is just a distant dream and the initial thought is still embryonic. "The biggest struggle is to be satisfied with the idea you are coming up with, not with the final visual output," he says.

Pekdemir begins with a question and lets the answer lead him to the result. "Most of the time, I start my works as though they are experiments by asking: 'How would a form react to a certain impact/force or to an extraordinary condition?'" Whether that form is a human body or an animal drawing of a theorem, Pekdemir follows through in his own way to break up the delicate membrane between idea and creation.

His images have sprung from questions such as, 'How would we look if we turned into boneless structures in a second or if the gravity on Earth was different?'. He also challenges the boundaries set within 3D programs, questioning the use of certain tools and applying them beyond their original purpose.

These key ideas, deforming images and misusing tools, run consistently through Pekdemir's work. A series like 'Soft Body' illustrates the haunting results of morphing a recognisable shape. "'Soft Body' is an ongoing project to experiment with how a body reacts and deforms when it suddenly becomes boneless, or the rigidness of the bones change, or how we would look if gravity was different," Pekdemir explains.

A glance over his other works shows that the act of distorting reveals just as much as it hides. The premise of his creations may be fictional, but the results offer the viewer a unique perspective into what is real. When asked how he wants people to react to his work and how he knows when he's got that reaction, Pekdemir doesn't have a clear answer. He does have an observation at one way his images have been perceived, though: "When I see my work featured on different websites, I notice the writers often use keywords like isolation, depression, loneliness and amorphous," he notes.

The fine art of 3D

Pekdemir's newer work reflects his current interest in plant life, cloud formations and their various possibilities

Pekdemir is planning to 3D-print his sculptures and lend the viewer control over what they see

Pekdemir follows the maxim that form and content must always follow one another

SURROUND YOURSELF WITH INSPIRATION

While Pekdemir draws his ideas from posing himself questions and then answering them visually, he also believes that social environments play a big role in how you act and behave.

When he began at Bilgi University, Pekdemir found inspiration in the company of like-minded people, but he also thinks that the place where you live plays a role in the way you think. Born and bred in Istanbul, he feels that the rapidly changing capital is inductive to complex thought. "Social environments surely change people's ways of thinking; their approach to handling problems and creating solutions," he says. "Istanbul is a chaotic, crowded city and the centre of migration in Turkey... It's home to over 13.5 million people and ranks as one of the largest cities in the world. You have to deal with traffic, catch buses, be at work and work harder to make a living here. This affects the way a person thinks and gives him or her a more complex point of view, rather than a simple one. You may lose your ability to think, in clean and simple terms."

A 3D FUTURE

Looking to the future, Pekdemir has plans to overcome the limitations of 3D work in a 2D space, by using a 3D printer to take his images from the digital realm to the physical one. As such, he is planning to print works such as *Clash* (right) to a life-size scale, to give viewers the ability to walk around it and appreciate it from every angle, rather than stick to the angle that he offers them.

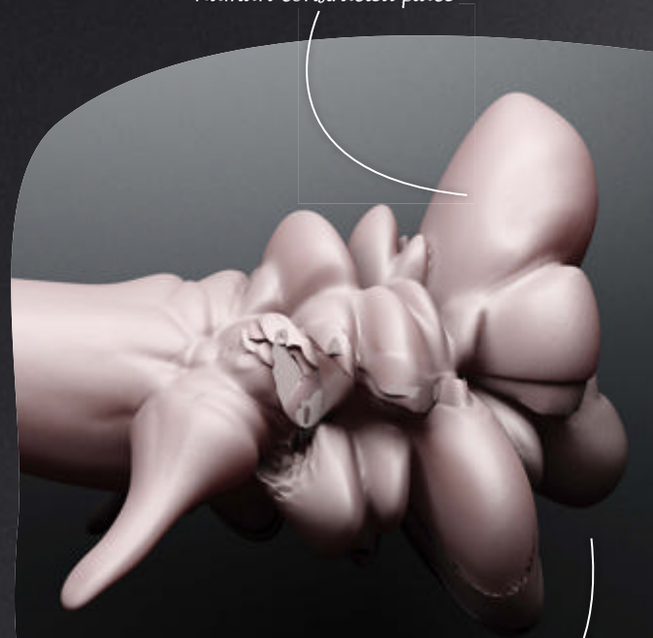
3D printing is achieved when a machine reads a digital design and lays down layers of liquid, powder or sheet material and then builds up from a series of cross sections. Since layers are added, printers have the potential to create almost any geometric shape – a must-have feature if they are to attempt to re-create Pekdemir's artworks!

There are also plans to take the dynamic series '7 Sculptures' one step further, as Pekdemir explains: "My future projection is to turn [the series] into an interactive project, where the user can be a part of [the art] by determining the location, time, space and exhibit it as a dynamic holographic sculpture." For now, though, Pekdemir is focusing on his current work and developing images around his new fascination with cloud and plant forms.

CLASHING FORMS

Intrigued by the deformation of animal anatomy, Can Pekdemir walks us through one of his images from the 'Animals' series...

To create this image I tried to visualise a clash; the sudden displacement of an animal from its natural environment to a human-constructed place



I modelled the base form of the image in modo, then sculpted it in ZBrush. I then went back to modo for the final render

The next progression I'd like to make is to use a 3D printer and create the image in true-to-life size!

LIFE OF PI: ACHIEVING THE IMPOSSIBLE

Chris McMahon talks to Rhythm & Hues and MPC about filming the unfilmable on one of the toughest projects either has ever tackled

The 2001 Yann Martel novel *Life of Pi* was labelled unfilmable for several reasons – not least because it required a 16-year-old boy to intimately interact with a hungry Bengal tiger aboard the confines of a stranded lifeboat. You can't exactly send a 450-pound wildcat to the Royal Academy of Dramatic Art and expect it to come back with the poise of Peter O'Toole, after all.

However, in a time where we've watched Frodo trek from Hobbiton to Mount Doom and witnessed the fantastical beasts come alive in *Where the Wild Things Are*, it's perhaps time to stop labelling any novel as 'unfilmable'. CG has caught up with the imagination – all you need is experienced studios like Rhythm & Hues and MPC to step in and do the hard work of moving it from a creative vision onto the silver screen.

That's exactly what the two vendors have helped achieve with *Life of Pi*, by bringing Martel's novel and the entirely ambitious vision of director Ang Lee to colourful, vibrant life. "The story of *Life of Pi* couldn't be pulled off without visual effects," explains MPC VFX supervisor Guillaume Rocheron. "You can't put a tiger in a boat with a kid. You can't put a kid in the middle of the Pacific Ocean. You certainly can't shoot big storms with all of that combined. Technically, it's been one of the most challenging projects we've done."

Jason Bayever, digital effects supervisor at Rhythm & Hues, agrees: "The standard at which [the film] was held was pretty much perfection," he remembers. "In every single shot we had to be able to fool people into thinking they were looking at a real ocean and a real tiger."

Based on the 2001 novel of the same name by Yann Martel, *Life of Pi* tells the story of the 16-year-old Piscine Molitor 'Pi' Patel. On a trip to Canada, Pi's family is killed in a violent shipwreck, leaving him stranded on a lifeboat with a hyena, a zebra, an orangutan and – most worryingly – a Bengal tiger, named Richard Parker. The ensuing story is one of survival, hope and passion.

Life of Pi: Achieving the impossible

CONTRIBUTORS

Guillaume Rocheron
VFX supervisor, MPC

Jason Bayever
Digital FX supervisor, Rhythm & Hues

Working out of offices based in London, California, Vancouver, India and New York, MPC (The Moving Picture Company) delivers world-class post-production and VFX for the film, advertising, digital and television industries. Its award-winning visual treatments have resulted in some of the most memorable film sequences and commercial projects to date.

Website www.moving-picture.com

Portfolio highlights:
The Lone Ranger (2013)
Man of Steel (2013)
Skyfall (2012)
Total Recall (2012)
Prometheus (2012)

Founded in 1987 and with studios in California, India, Malaysia, Canada and Taiwan, Rhythm & Hues is one of the major players in the VFX market. It received the Academy Award for Best Visual Effects for 1995's *Babe* and 2008's *The Golden Compass* – two projects that clearly fed into the studio's work on *Life of Pi*. R&H also contributed to *X-Men: First Class* and *The Hunger Games*.

Website www.rhythm.com

Portfolio highlights:
Django Unchained (2012)
The Hunger Games (2012)
The Cabin in the Woods (2012)
X-Men: First Class (2011)
The Wolfman (2010)

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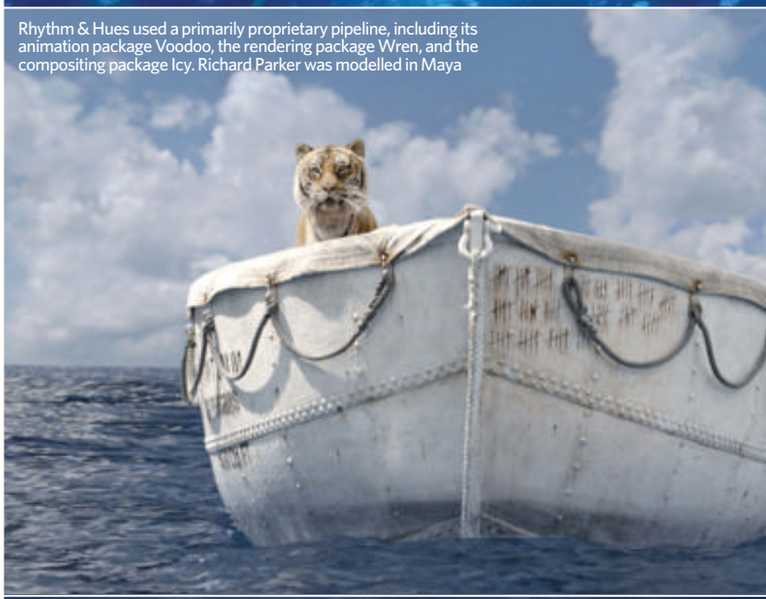
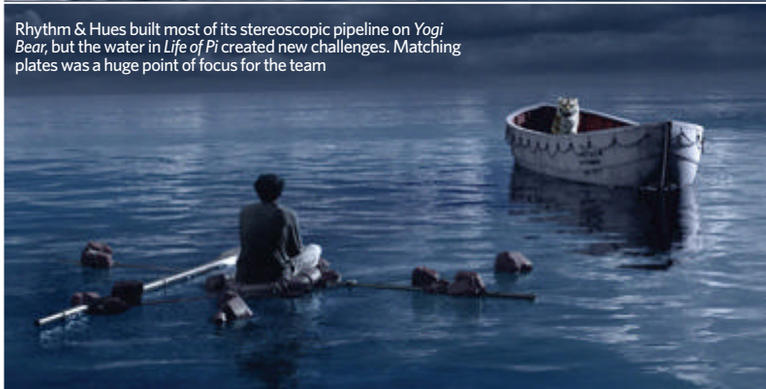
Life of Pi: Achieving the impossible

To create this sequence, Rhythm & Hues used Houdini's particle system and attached a bioluminescent jellyfish to each particle. An inverted steam simulation created the water mist

Rhythm & Hues used a primarily proprietary pipeline, including its animation package Voodoo, the rendering package Wren, and the compositing package Icy. Richard Parker was modelled in Maya



Rhythm & Hues built most of its stereoscopic pipeline on *Yogi Bear*, but the water in *Life of Pi* created new challenges. Matching plates was a huge point of focus for the team



PHOTOREALISTIC ANIMALS

Richard Parker is a hulking, ravenous beast of an animal trapped within the confines of Pi's tiny lifeboat. It was Rhythm & Hues' job to bring the creature to life in a completely convincing manner, and thankfully the team has had some experience in the matter. "We did Aslan on *The Lion, The Witch and The Wardrobe* and we also did Stelmaria on *The Golden Compass*, so we had a baseline to start from," says Bayever. "We also had a lot of the muscle stuff that was developed for *Hulk* and really good skin simulation from the digital bulls in *Knight and Day*. We brought all of these systems together for Richard Parker."

Detailed reference was also a huge help, with the Taiwanese set for *Life of Pi* playing home to several real-life Bengal tigers. "The animators had close-up footage of the tiger walking, so they could see details like how the paw moves and the pads slide a little bit as they walk," says Bayever. "They rigged Richard Parker to be as light and controllable as possible. The team needed to consider the environment in his movement, as a lifeboat is not usually suited to a jungle cat. Even in shots where he's moving around or aggressive, the animators need to counter-balance him against the rocking of the boat. That way you feel like he's really in there and reacting to his environment in addition to doing his action in the scene."

Once locomotive animation was done, Richard Parker was passed to the technical animation department, for the muscle and fur simulations to be run to match the details of a real tiger. "Depending on what part of the body it is, you get different movement," says Bayever. "On the arms it's tighter skin, so you see all the muscle definition, but on the stomach and in the inside-hip area it's like a sack of skin that the legs move around inside. You have to get those areas matching reality perfectly."

When it came to lighting, the team at Rhythm & Hues added subsurface scattering to the fur rather than compositing or lighting tricks, giving it the same kind of depth you would get from a real animal. "As far as the rendering goes, whether it was a fully CG shot or not, we used the real boat to bounce light up into Richard Parker," says Bayever. "The tiger's chest is white, so we needed a nice bounce light from the orange boat onto his chest. It was all ray-traced onto him – the whole environment."

One of the most-complicated components of Richard Parker's creation was getting him wet. "When it's underwater, the fur has to react and move like the water is pushing it around, then when it's above water it sticks down to his body," says Bayever. "To achieve that we ran the water simulation in Houdini and then handed off the velocities of the water to our technical animation department and our proprietary animation software Voodoo. They ran their simulation using those velocities and were able to have the fur move according to the motion of the water. If the water rolled up his back it would actually push the hair up too and then as it rolled down it would flatten it out."

Life of Pi: Achieving the impossible

> "In every single shot we had to be able to fool people into thinking they were looking at a real ocean and a real tiger"
>
> **Jason Bayever,** VFX supervisor, Rhythm & Hues

On average, Richard Parker took 30 hours to render in stereo – twice the amount of time it takes than in 2D. The render had to take into account various factors such as the raytracing and subsurface scattering

MASSIVE SIMULATIONS

Jason Bayever tells us about Life of Pi's difficult flying-fish sequence

"The challenge was that these fish fly really quickly – around 35mph. You can add into Massive something that says, 'when you hit something, die and fall down' – that's easy enough. But when they're moving so fast that at the start of the frame they could be in front of the character and by the end of it they're behind them, you just won't get that contact and they'll fly right through the object. What we had to do was simulate the scene at 120 frames-per-second, so it could pick up on that hit. Another challenge was the amount of geometry we had to bring into Massive – these fish might pull their wings back and swim, or when they're outside the ocean they extend their wings and flap, or if they're gliding they wiggle to push themselves forward... All of this had to be pushed into Houdini with the splashes, foam and water churning underneath. It was a huge amount of data."

Rhythm & Hues also worked on the crowd simulation in *Life of Pi*'s island sequence, where it created thousands upon thousands of meerkats. Thankfully, these *weren't* moving at 35mph!

THE WORLD OUTSIDE

Creating the world around Richard Parker was almost as difficult as creating the beast himself. A lot of extension work was required, given that the movie was primarily shot in a huge bluescreen wave tank. "Ang Lee was very specific that he wanted the skies and ocean to be a character in the movie," says Bayever. "They had to set the tone and feel of a scene – they couldn't just be background. Lee was very specific about how that mood was to be set, even down to the amount of clouds in the sky. As such, we knew we needed to create a library of... very, very large HDR images, because those would be our background plates."

Rhythm & Hues shot 16,000 images from a variety of marine locations and ended up with plenty to build out each environment for the film. "That whole sky had to move through our entire pipeline as an HDRI," explains Bayever. "We actually created a system where our matte painters could paint on the HDRIs. The shots could then pass through and those same HDRIs could light the ocean surface and light Richard Parker. It was all the same image that did everything per scene, which is why it all comes together so well."

The sea also had to be extended into the far horizon, given that many shots of the lifeboat were taken in a tank with a wave machine in order to provide the movement. This meant Rhythm & Hues had to somehow match the look of the practical waves in its digital re-creations. "Historically there's been very little control to the way we've created our ocean surfaces," says Bayever. "We'd just stack displacement maps on top of one another until we got a nice-looking ocean. In this case, because we were matching a real plate, we opened up all of the physical controls in the shader and gave our ocean layout lighters much more controls to create a realistic surface. [This meant] the waves didn't necessarily have to follow a certain paradigm.

"We could get the water moving in different directions and interacting with itself through this procedural shader. We could match the tanks and the waves coming off it to perfection," he continues. "Also, because all of the controls were available to the artists, they were able to put artistic interpretation into the waves. It was never outside of the physical realm, but they could play with the numbers to get the waves that the director wanted."

Life of Pi: Achieving the impossible

MPC needed to be able to animate and direct the ocean like a character, as director Ang Lee didn't want the framing and timing of his shots to rely on the uncertainty of simulation

SUBMERGED CGI

Guillaume Rocheron discusses the difficulties in creating the moments Pi spends underwater

"We had three underwater shots to work on, but the biggest was when Pi goes into the ocean, swims down and gets a clear view of the Tsimtsum sinking into the abyss. It was a challenging shot because it's a pretty unique view and a whole minute long. The original plate was filmed against bluescreen in the deep tank and we re-animated the camera to increase the depth that Pi swims to. The same method for simulating water from above works for below, so we rendered the bubbles and the foam sitting on the surface. We also spent a lot of time balancing the look of the shot and the visibility. Technically, in these conditions at night you wouldn't see anything, but we forced the visibility a little to be able to see some of the windows and lights of the Tsimtsum. That way you can get the point of the shot across: that Pi loses everything, and now he's completely alone."

To make the shot work in stereo, MPC filled the huge gap between the Tsimtsum wreckage and Pi with a simulated layer of plankton and murky water. Doing this ensured that everything in the shot felt connected, rather than floating independently

SHAPING THE WAVES

Finding ways to add artistic expression to the timing and tempo of the film's waves was a process MPC also became very familiar with, given its work on two central sequences – the sinking of The Tsimtsum and the climactic Storm of God. Both scenes required waves of such incredible size that even the huge tank in Taiwan was simply incapable of re-creating them.

The planning and execution of the storm sequences took more than two years to complete, but this totalled at around 15 minutes of the scene you'll see in the film. "We've done CG oceans in the past, but the thing that was striking here was the duration of the shots," Rocheron explains. "The work we did on the shipwreck and the Storm of God sequences comes to about 100 shots, which is not much when covering 15 minutes of film. Those are very, very long takes. It was a big challenge in terms of the length of the simulations and the level of detail we needed to reach. It's actually easier when you have fast cuts and you can make things work in a couple of frames, so the eye never has time to settle on anything. When you're doing shots that are 20 or 30 seconds, the viewer really has time to watch every single detail."

In order to create believable waves, MPC worked closely with Scanline, the maker of the Flowline fluid-simulation software. For several months the R&D team attempted to devise new simulation techniques to meet the demands of director Ang Lee. "Ang is a storyteller and he was very clear right from the start that we needed to be able to operate these oceans as much as possible," says Rocheron. "So that's how we treated it: we approached the ocean as much as a character in the film as Pi or Richard Parker."

The team faced one major complication – fluid simulations simply don't lend themselves to the kind of precision VFX required for character animation. The solution the team eventually reached was a new simulation method termed the Refined Sheet – something that gave MPC the ability to drive its simulations with an animated surface. "Using a pre-made surface – in this case a piece of geometry representing the main ocean shapes – we were able to emit a thin sheet of voxels that was only a couple of feet deep over that surface, to simulate the interactions and the water flow," explains Rocheron. "That base surface would make everything flow like water on top of it, but the layout and composition wouldn't change. This would allow us to lock the shot pre-simulation but also to concentrate our computing power only on a few feet of water, instead of the full ocean from top to bottom. This enabled us to dramatically increase the level of detail."

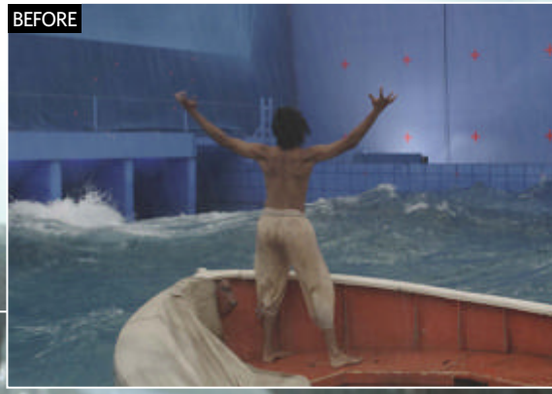
The R&D team worked on a layout toolset based on Tessendorf deformers and Gerstner waves to enable the artists to create a non-simulated, geometric representation of the ocean, with a variety of controls to tweak every single component. "The shots are so long and complex, and we worked so much on the timing of every shot, that there's nothing in there that's random in terms of the wave composition, the wave hits and that kind of

Life of Pi: Achieving the impossible

Although the wave tank built in Taiwan is one of the largest of its kind, CGI was still required to achieve the truly violent weather conditions presented in the film

AFTER

BEFORE



> "Once you have the water surface complete you're not done, because the air is just filled with water – there's spray, foam, mist and bubbles too"
>
> **Guillaume Rocheron,** visual effects supervisor, MPC

thing," continues Rocheron. "We would start with a pre-established base layout of the ocean. We were able to say we know that waves in the deep ocean, in hurricane conditions, are 60m high and 250m long and there's a period between them of 12 seconds, so we would have realistic properties in terms of the wave sizes and timing. We could then program that using layout tools, with the artist being able to add, remove, shape or keyframe individual waves. We could really sculpt and shape the shots of the ocean in the way that they needed to be... We would spend months and months animating that base layer, reviewing it with Ang, locking down the shot design and layout before we even started the simulation work using our 'refined sheet' technique. At least we knew that no matter what we did, it wouldn't change the base layout of the ocean shape. That [aspect] was a real game-changer for us."

When the team at MPC had the shape of the ocean determined, it was time to work on the details. "Once you have the water surface complete, you're not done, because the air is just filled with water – there's spray, foam, mist and bubbles too," says Rocheron. "We simulated the water-surface-emitting-spray, which would get picked up by the air field we were simulating over the ocean surface and become mist, or fall back down into the water. When the spray collides back down into the water it becomes bubbles and when they rise up on the surface they become foam...

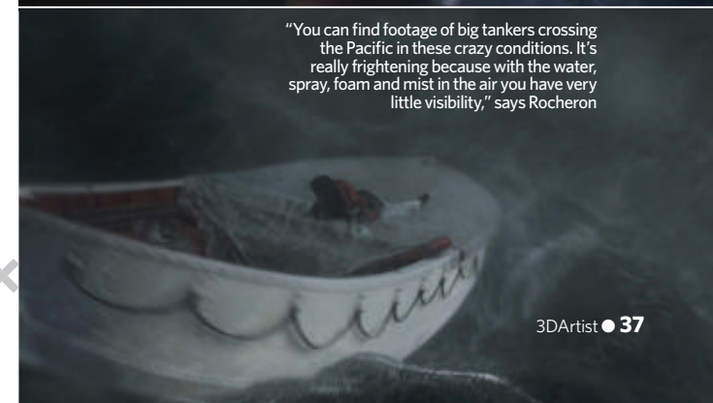
"We ended up simulating literally millions of elements," continues Rocheron. "One shot, when the Tsimtsum is hit by a huge wave, contained somewhere around 1.5 billion particles – just for one shot. I think it was the record for simulated particles in a single shot. It's a huge amount."

The result of the hard work by MPC and Rhythm & Hues is one of the most visually stunning films in recent years. The film shows that VFX don't need to exist solely as giant robots and explosions, but can display beauty, exploration and emotion.

"The project has been very different for us, as it's not a blockbuster in the traditional sense," concludes Rocheron. "The visual effects... tell the story and that's what Ang is all about. He's a story-teller and that's what matters to him – it's not about having the biggest and best visual-effects shots in a film – it's about whatever is required to tell that story."

Life of Pi required the creation of more than just CG tigers – there's a veritable bestiary of animated animals encountered throughout

This shot contains 1.5 billion particles – the record for simulated particles at MPC in a single shot. For the shipwreck sequence alone, the data storage size was larger than all shows MPC Vancouver had done combined



"You can find footage of big tankers crossing the Pacific in these crazy conditions. It's really frightening because with the water, spray, foam and mist in the air you have very little visibility," says Rocheron

SKYFALL VFX

Chris McMahon talks to Cinesite and MPC about the art of creating grounded visual effects for Bond's latest explosive outing, Skyfall

To the untrained eye, 007's latest adventure might seem no more of a CG-enhanced film than his first, with *Skyfall* featuring a plethora of practical effects and stunts that could arguably be achieved without the need for any VFX software whatsoever.

But as the readers of this magazine will be very much aware, *Skyfall* is actually replete with visual effects ranging from the minute to the elaborate. Vendors MPC and Cinesite provided a variety of work, from compositing frozen breath over actors' mouths to animating entirely CG-driven Komodo dragons. It may be difficult to describe the finished film as powered by CG, but the glue holding *Skyfall* together is certainly the VFX.

Nevertheless, working on the film was a very different experience from creating supplementary visuals for features such as *John Carter*, as Cinesite VFX supervisor Jon Neill explains. "There's a big difference from working on a film like *Skyfall* compared to something like *John Carter*," he tells **3D Artist**. "With a Bond film the challenge is always to ensure the reputation for performing physical effects is upheld. The digital effects we create have to be photoreal to complement the production."

MPC VFX supervisor Arundi Asgregadoo similarly had to ensure the studio's VFX work stood firmly in the realms of reality. This ensured the film presented a far more believable experience than that seen in Ridley Scott's 2012 blockbuster *Prometheus*. "In a film like *Prometheus*, where the entire landscape is fantasy, there are no preconceptions to deal with. However, the landscape in the closing third of *Skyfall* is based on mountains in Scotland and most people already have some impression formed of what that should look like," he explains. "As such we had to work very closely with Sam Mendes (director) and Steve Begg (studio supervisor) on a creative process to establish the right look and feel for the film."

Images:
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AFTER

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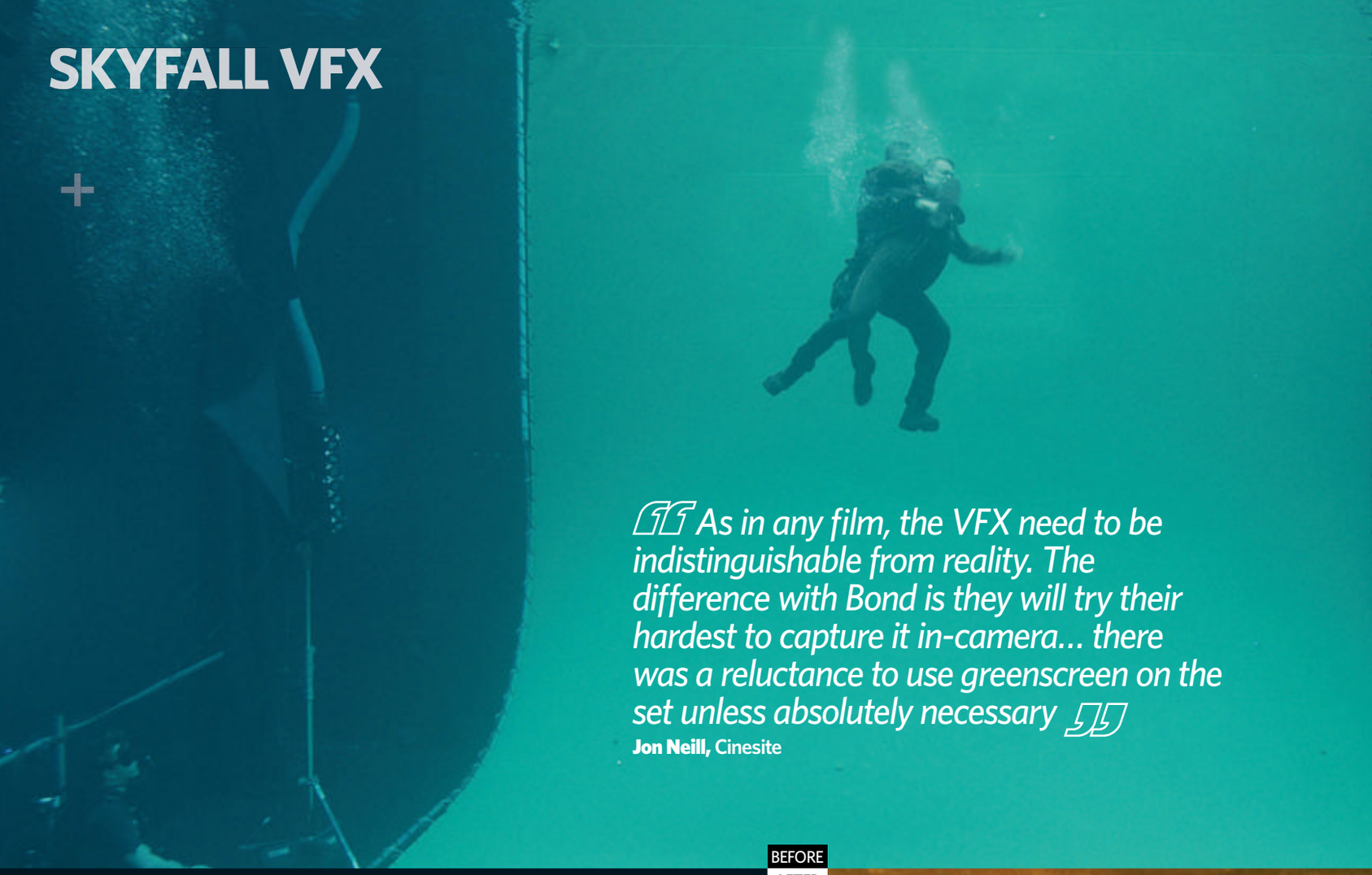
Title VFX supervisor
Company Cinesite
Bio Neill is one of the most experienced CG and VFX supervisors in the UK. Prior to *Skyfall* he supervised shots for *John Carter*. Before this he worked on *Marmaduke*, a major sequence for Fox's *Wolverine* and the TV series *The Prisoner*. He has a background in traditional art, with a degree in Drawing and Painting and a diploma in Electronic Imaging.

Name Arundi Asgregadoo
Title VFX supervisor
Company MPC
Bio Asgregadoo joined MPC in 2001, working on such films as *Troy*, *Kingdom of Heaven* and *Alien vs. Predator*. In 2005 he stepped up to the position of 2D supervisor, which he held on the likes of *Harry Potter*, *X-Men: First Class* and *Dark Shadows*. He has also worked for Jim Henson, The Mill and Framestore, and is a graduate of Bournemouth College of Art & Design.

ON DVD & BLU-RAY 18 FEBRUARY

Skyfall sees James Bond investigating an attack on both M and MI6 by the ruthless Raoul Silva. Returning to service following an injury that almost kills him, Bond must overcome his physical and emotional turmoil. Directed by Sam Mendes and captured for film by Roger Deakins, it's one Bond adventure that you really don't want to miss!

SKYFALL VFX



> *"As in any film, the VFX need to be indistinguishable from reality. The difference with Bond is they will try their hardest to capture it in-camera... there was a reluctance to use greenscreen on the set unless absolutely necessary"*
>
> **Jon Neill,** Cinesite

REALISTIC ENVIRONMENTS

Although hardly as exotic as the distant plains of *Prometheus*'s LV-223, the mountainous valleys of rural Scotland that appear in *Skyfall*'s final third are indeed heavily augmented by VFX. In fact, it's not even Scotland.

"At the pre-production stage we discussed the approach in creating the environment for Skyfall Lodge with Steve Begg," says Asgregadoo of MPC's work on the Scottish moors. "The overall aim was to turn Guildford's Hankley Common into the Upper Highlands of Scotland!

"We had over 200 shots within the end sequence that required some form of environment enhancement or full-CG environment," Asgregadoo continues. "James Kelly (MPC's photographer) captured a number of panoramas of the Upper Highlands of Scotland. These were then combined with reference photos taken of Hankley Common. Meanwhile, Isabella Rousselle (lead digital matte-painting artist) and Jerome Martinez (lead environment artist) set about creating a 360-degree Cyclo using Maya and NUKE.

"The other aspect to the *Skyfall* environment was... [the lodge itself]," he explains. "[This] was a partial on-set build, with the art department erecting the outer walls and part of the roof. We then had to create a CG roof extension and add a layer of decay to the [building's overall look].

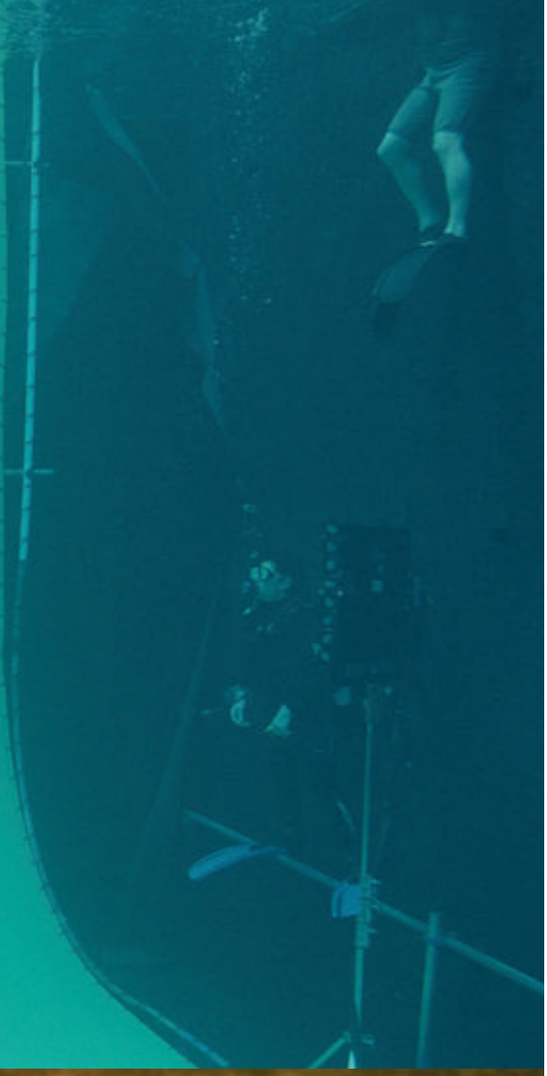
"Once we had established the layout of *Skyfall* with Mendes, Matt Packham (compositing supervisor), Martin Riedel (lead compositor) and their team set about blending the DMP images with the plate, adding layers of mist and hanging clouds to create a cold and atmospheric image."

Environmental effects such as set extensions were also employed by Cinesite, especially when filming the sequences set in the iconic London Underground. It's here that the studio worked on the exciting chase sequence through the city's sprawling subway network.

"For the platform-chase sequence, half a physical train carriage was built by production on-set at the Pinewood 007 stage and rigged to travel down the rails while Bond jumps on the back of it," explains Neill. "Our team was tasked with augmenting the physical effects by extending the carriage using Maya, adding other CG carriages with passengers composited in and adding the train driver to the scene using NUKE.

"Creating a photoreal train that tracked and matched the physical set piece was a challenge. The sharp reflections on a moving train using multi-sampled motion blur pushed up the render times, but were essential to maximise realism. Additionally, merging on-set carriages with CG carriages meant seamless integration and realistic reflections had to be precise."

Asgregadoo states that a lot of physical stunt work can make VFX easier, as there's always something to match their work to, but with the downside that plates require extensive cleaning up



"The dragon's interaction with the live-action plate meant lighting and contrast had to be carefully thought through to ensure things like the depth of field and the dragon's shadows were cast correctly" **Jon Neill,** Cinesite

REALISTIC ANIMAL PERFORMANCE

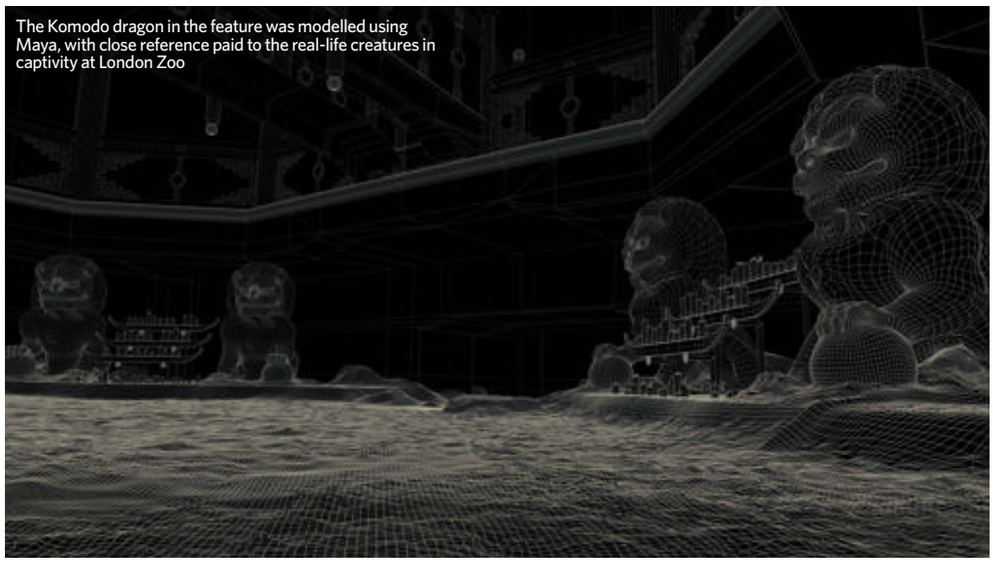
Cinesite's John Neill reveals the challenges of creating believable Komodo dragons

"Our creature team was tasked with creating a full-CG Komodo dragon that had to interact in a live-action environment with actors. It was the most challenging sequence – especially where the animal is close up, as we needed the loose skin around its neck to react realistically and have the creature's feet interact with the ground.

"The team modelled the dragon using Maya. We had a series of reference photos that we'd taken at London Zoo where they had two Komodos in captivity. Texture was added to the model using MARI, Photoshop and Mudbox, so when animating we concentrated on the eye blink and subtle saliva stretching as it opened its mouth. The Komodo was composited into the live-action plate using NUKE.

"The scene was particularly challenging because the dragon's interaction with the live-action plate meant lighting and contrast had to be carefully thought through to ensure things like the depth of field and the dragon's shadows were cast correctly in proportion to the actors in the scene.

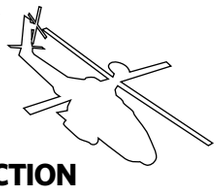
"Having Bond look like he was stepping on the back of a moving Komodo instead of a static ramp was also challenging, as was the part where the Komodo bites and locks onto the baddie's leg. The scene was further enhanced by the additions of CG dust and gravel that mirrored the action within the pit."



The Komodo dragon in the feature was modelled using Maya, with close reference paid to the real-life creatures in captivity at London Zoo

The shot where the Komodo moves in for the bite was difficult as its neck is hidden in shadow, meaning there was very little to animate. As such, Cinesite had to get creative...

SKYFALL VFX



PHOTOREALISTIC DESTRUCTION

Arundi Asgregadoo talks us through how MPC convincingly crashed a helicopter into the side of Skyfall Lodge...

"Towards the end of the film Bond tries to create a diversion by blowing up Skyfall Lodge. The debris from the explosion hits a helicopter, causing it to crash into the lodge.

"In the early stages, the sequence was blocked out in the form of a pre-vis for Sam Mendes (director) and Roger Deakins (director of photography). In the pre-production stage, they wanted to approach this sequence using miniature buildings, so a 1:3 scale was built of the lodge and the helicopter. Chris Corbould (second unit director), together with Steve Begg (studio supervisor), directed the sequence, which was shot at Longcross Studios.

"The footage worked pretty well, but it was felt that there were a number of elements missing from the shot. The main issue was the movement of the helicopter, due to the restriction of the rig.

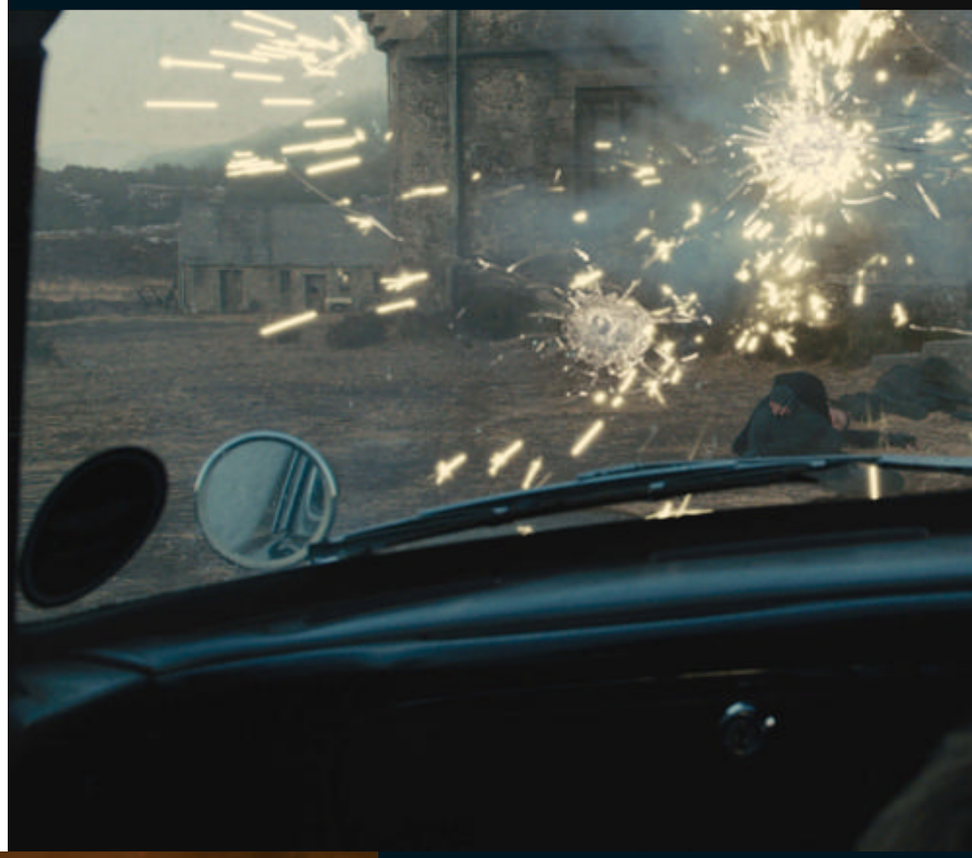
"Sheldon Stopsack (CG supervisor) and Dave Griffiths (lead compositor) set about reanimating the helicopter. Using a combination of the CG helicopter and reprojecting onto the plates allowed us to adjust the vehicle's speed, pitch and roll. The team also added CG rotor blades to the helicopter and downdraft to each of the shots.

"Regarding the crash, one of the main things Steve wanted was for the rotor blades to slice through the front of the building, so we re-created a CG version of the lodge, which could be broken apart one stone and tile at a time. We used our in-house destruction tool, Kali, to create the objects being damaged and blown apart, including falling and exploding debris."

MPC's proprietary destruction toolkit, Kali, gives the team at MPC control over gravity and other forces that would affect such a crash as that seen in *Skyfall*

"Creating a photoreal train that tracked and matched the physical set piece was a challenge. The sharp reflections on a moving train using multi-sampled motion blur pushed up the render times, but were essential to maximise realism"

Jon Neill, Cinesite



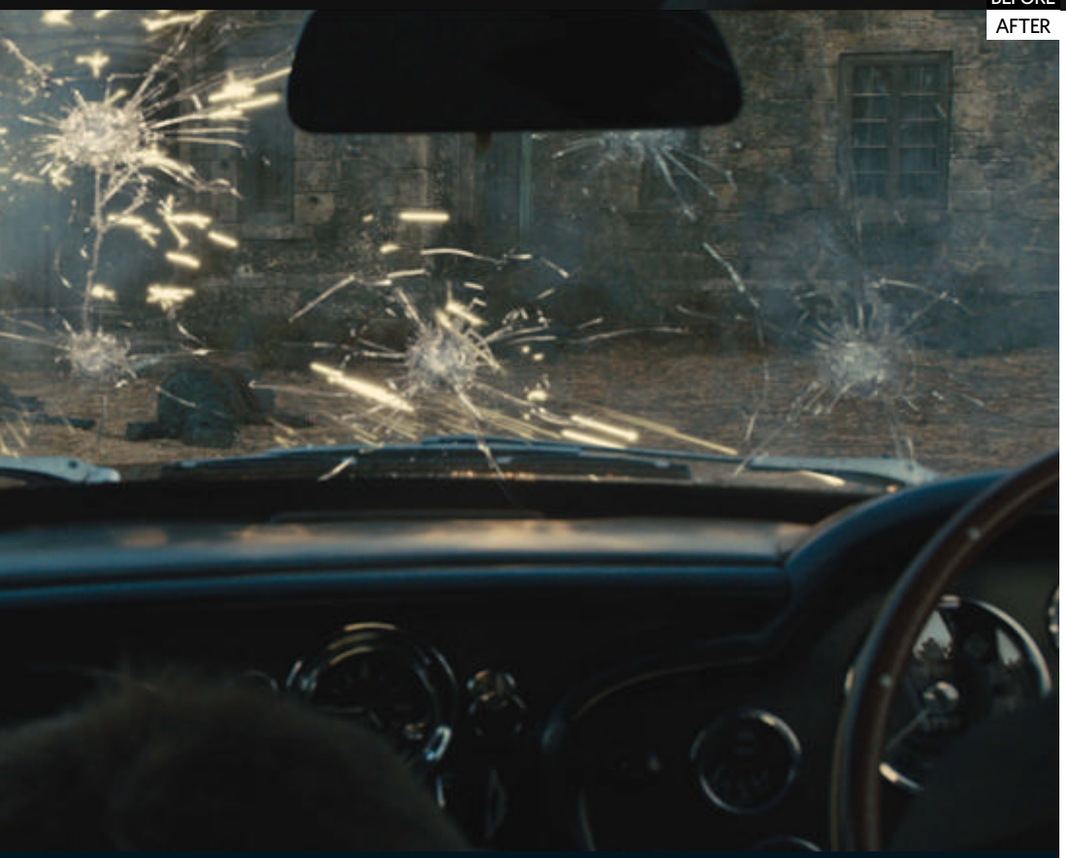
All of the VFX work aimed to enhance rather than compete with the stunts and physical sets, which are so unique to the Bond franchise

A DIFFERENT APPROACH

The catacomb sequence showcases the symbiotic relationship that existed between *Skyfall*'s practical effects team and the work of Cinesite. "We were responsible for a digital set extension to expand the look and feel of the catacomb and give it added depth," says Neill. "We did this by creating digital matte paintings in Photoshop and projecting them onto a 3D mesh in NUKE to build up the environment and give the perception of extending the archways."

It's in this scene that a train comes crashing through the roof towards Bond. Unlike the majority of VFX-enhanced stunt work, however, greenscreen wasn't used to implant Daniel Craig in the shot.

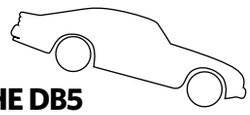
For Cinesite the use of NUKE has proven a huge benefit, enabling the team to model assets and create a 2D projection from the on-set images, tracking them to the interior to match the 3D



"As in any film, the VFX need to be indistinguishable from reality. The difference with Bond is they will try their hardest to capture it in-camera…" says Neill. "For example, there was a reluctance to use greenscreen on the set unless absolutely necessary. Roger Deakins (director of photography) didn't want green contaminating his lighting. As such I learned, in some situations, that just using roto can create a better result.

"In the train-crash sequence there were ten cameras set up and I couldn't put up green or black screens as they would have been in the way of at least two cameras…" explains Neill. "We shot Bond with all ten locked-off cameras, then we shot the crash with all ten cameras and rotoscoped Bond in. This meant that he was in the exact lighting and he was more [convincing] than if we had shot him in a green room."

A lot of the work on scenes such as this goes into cleaning up the plate – making the scene feel authentic while beefing up the final look. "To achieve the cleanups and augment the look of the sets, we ensure that details like shadows and lighting are always at the forefront of the audience's minds," says Neill. "As a visual-effects supervisor you have to be aware of how the set is being lit and where the camera is positioned. It's also essential to take as many stills of the set as possible, as these come in very handy when we're starting work on the rushes."



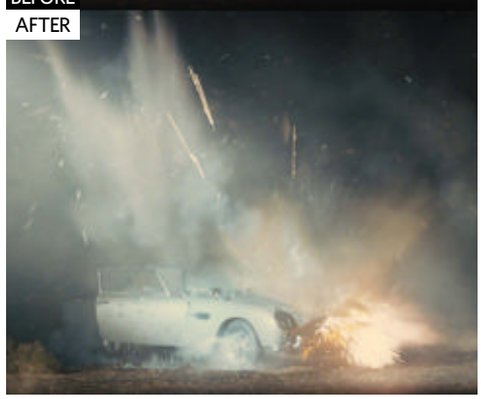
DESTROYING THE DB5

Arundi Asgregadoo reveals how MPC ripped through Bond's classic Aston Martin…

"This was an interesting challenge – destroying the iconic Aston Martin DB5! There were several stages of destruction of the DB5. In the first wave of the attack, the DB5 is damaged by a hail of machine-gun fire. The approach here was a 2.5D solution. First we created a CG model of the car using reference photos. The DMP images of the bullet holes and cracked glass were then projected using NUKE onto the live-action plate of the DB5. Once we had laid out the damage, Sam Mendes was then free to adjust the amount visible.

"The second stage of destruction comes when Bond villain Silva orders the Merlin helicopter to open fire on the DB5. To achieve this, Steve Begg had a full-scale version of the car built so they could blow it up. We combined this footage with the CG DB5 onto a plate and other elements were added, such as breaking glass."

Although many of *Skyfall*'s explosions are practical, most are augmented in some way with additions such as CG particles



BEFORE
AFTER

> *We had over 200 shots within the end sequence that required some form of environment enhancement or full-CG environment* **Arundi Asgregadoo,** MPC

Not only were set extensions used to complement the production's physical set of London's Underground, but entire mountainous valves were created to turn Guildford into rural Scotland

FINISHING TOUCHES

For the challenging climatic sequence – in which Bond chases Silva across the Scottish moors – several blackscreen sets were constructed to create the thick, clogging sense of darkness surrounding the scene. "The chase was shot on a black stage at Longcross Studios," Asgregadoo explains. "The real challenge was to make the set look like it was shot at Hankley Common.

"We took shots of the miniature buildings post-explosion (see Photorealistic Destruction) and the elements from Hankley Common to create the burning lodge, then added a CG damaged roof," Asgregadoo continues. "Roger Deakins came up with a complex lighting rig to simulate the lodge on fire and we added the flame elements as well as layers of smoke and mist to re-create a chilling environment.

"Our main aim was to maintain the stylish feel Roger Deakins had created," he continues. "That warm tonal range also had to be maintained for the underwater fight scene. For this we utilised a 2.5D approach, using projected DMP images onto a geo surface. These were then augmented with 2D bubble elements."

Overall, the two vendors are incredibly impressed with the extensive physical work that goes into a modern-day Bond production. "The Bond team really does pull out all the stops and wherever possible perform the effects and stunts physically," says Neill. "This is what the franchise is built on and it's a great attitude to have. Therefore in the film there are some scenes where the audience may expect it to be CG work, but it's not. A lot of our work on *Skyfall* consists of cleaning up the scenes, such as removing rigs, taking out members of the crew who are in the camera shot, or enhancing dust and debris to augment the look and feel of the physical set."

The work has not gone unnoticed, however, with *Skyfall* being one of the most stylish, clean-cut and visually stimulating Bond films of the entire franchise. "All of our effects needed to complement the physical sets and stunts, and we kept this mantra in mind for everything that we did on *Skyfall*," concludes Neill.

A lot of the VFX work in films like *Skyfall* consists of cleaning up images, such as removing the filming crew or ensuring that elements like lighting and shadows are properly pronounced

BEFORE
AFTER

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Know your VFX tools

Lightfarm Studios created this impressive image – which happens to depict some of the toughest challenges in the VFX world – for the American company Atkore, which manufactures pipes and wires

© Lightfarm Studios

KNOW YOUR VFX TOOLS

Visual effects are required for a multitude of tasks and a long list of programs can be used. The VFX artist, therefore, should be a jack-of-all-trades – and a master of some!

The potential career of a VFX artist is varied. You could be making smoke and fire to bring an explosion to life one day, creating a rainstorm the next and compositing animation with live action on a daily basis. You'll use a lot of the same software as modellers or animators, but you won't always use the same features inside them and will pick other dedicated plug-ins and programs too.

To excel, you need to know many different software packages, because they all have different strengths and weaknesses. Every company and production has its own pipeline, so you can tackle the different challenges VFX can pose in unique ways.

The list of programs that follows isn't an exhaustive one by any means, but the tools mentioned will enable you to take on a lot of the jobs you'll be tasked with, like texture-mapping, camera-tracking, lighting, compositing, rendering, hard- and soft-body dynamics, fur, fluid, fire and more.

Whether you've got to bring to life the Battlestar Galactica for an entirely new series, or you're just doing a personal animation to show off your 3D skills, the VFX can be what makes or breaks your work. Great VFX can certainly add a wow factor, but it's also the invisible glue that holds your fictional worlds together and turns a good shot into a great one.

*All prices correct at time of printing

HOUDINI

What does it do?

You can complete character animation, lighting and rendering in Houdini, but it's VFX that's at its very heart and soul. Now in its twelfth version, the entire program works in a procedural way, which means that its collection of nodes is connected to everything else, with the idea of enabling the digital artist to do more in less time. The latest release includes Pyro FX 2 for better fire and smoke simulations and improved FLIP fluids with variable viscosity controls.

Case study:

GUSTAV MELICH

"When building a generic debris setup in Houdini to be reused later with a large-scale destruction simulation, each debris piece is represented by a point and all the initial properties are saved on the points as attributes," Melich (**http://melich.org**) explains. "All the points and the proxy geometry get fed into DOPs using the RBD Point Object node. This way the geometry gets instanced to the points, making the setup light and fast. I use Houdini's built-in Bullet solver for running the RBD sim. The environment gets created in DOPs as static RBD objects, then represented by convex hulls for fast collision-calculation.

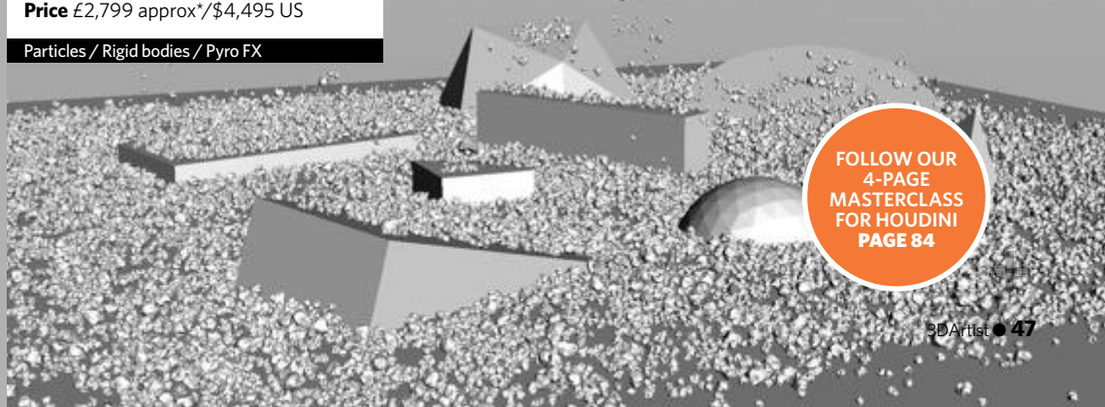
"Using this setup I'm able the run simulations with 25,000 pieces of debris in two to three hours. Adding the result of this secondary simulation to the primary RBD simulation makes a huge difference!"

Houdini's built-in Bullet solver is perfect when creating multiple simple shapes. It enables Melich to quickly and efficiently form his debris setups

Houdini
3D ANIMATION TOOLS

Website www.sidefx.com
Price £2,799 approx*/$4,495 US

Particles / Rigid bodies / Pyro FX



FOLLOW OUR 4-PAGE MASTERCLASS FOR HOUDINI PAGE 84

Know your VFX tools

"Every project we work on has a new problem or technique that needs to be developed," says Burch. "RealFlow has come on leaps and bounds in the last few versions and so has the plug-in for Softimage"
© Lumiere Studios/Strongbow

NUKE

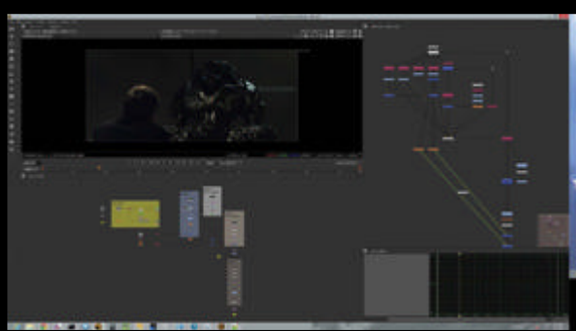
What does it do?

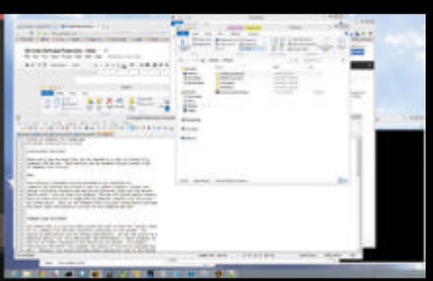
This powerful compositing program has 200 creative nodes for its users to control, including rotoscope and vector paint tools, colour correction, Gaussian and Vector blur, grid and spline warping, multiple compositing merge methods and much more. The app also offers a 3D workspace, which means the VFX artist can manipulate 3D alpha shadows, tessellation settings and so on. It also features a stereoscopic workflow and you can do 2D-to-3D conversion through various methods, depending on your preference. The advanced version of the software, NUKEX, adds 3D camera-tracking and particles.

Case study:
ROBERT NEDERHORST

VFX artist Robert Nederhorst (**http://throb.net**) worked on a short film, 'Archetype', by Aaron Sims. The challenge was integrating a fully CGI robot into the live action. Nederhorst explains that they "started out with full HDRI lighting but render times were longer than we wanted, at around 15 minutes per frame. By relighting it using only standard, unmapped, V-Ray lights, we got the times down to five to eight minutes per frame."

Once the lighting rigs were in place, "the renders came out as OpenEXR files to NUKE", says Nederhorst. "Using a multi-layered compositing setup I created a gizmo that would assemble the parts as the renderer assembles them. I was careful to not use any multiply/dividing math to avoid any possible sub-pixel data loss. I've seen it happen too often and it's always a pain to deal with! Once we were able to set up this pipeline of rendering and basic compositing, it was [common] for the artists to get to 85-90 per-cent quality, with consistent results right out of the gate."





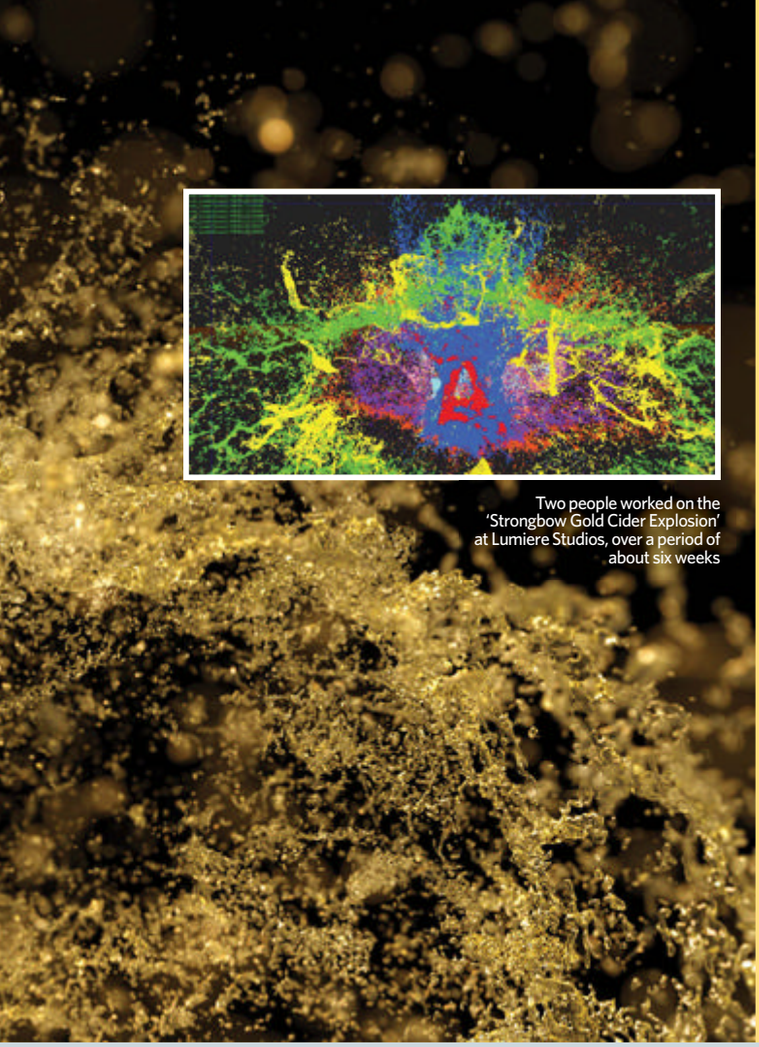
Nederhorst wanted to get as many renders as possible into NUKE. He explains: "While 15 minutes is not a bad render time, it's always a good idea to optimise, since that means more iterations and equals higher quality"

It was a challenging project, but Nederhorst is pleased with the results. He adds: "They speak for themselves as Aaron [Sims] was able to sell the pitch to Fox, who is now developing it as a full-length motion picture"
© Aaron Sims

NUKE BY THE FOUNDRY

Website www.thefoundry.co.uk
Price £2,499 / $4,155 US

Compositing / Rotoscoping / Colour correction



Two people worked on the 'Strongbow Gold Cider Explosion' at Lumiere Studios, over a period of about six weeks

REALFLOW

What does it do?

Also compatible with Maya, 3ds Max, Houdini, Softimage, LightWave and more, RealFlow is a standalone fluid-simulation package designed to create anything from a single drop of water to a massive tidal wave. For the smaller simulations you can use RealFlow's grid/particle solver, called Hybrido, to generate and control millions of particles. For your smaller water needs, there's the SPH (Smoothed Particle Hydrodynamics) solver, which enables you to create an enormous amount of detail, because each particle can be seen as a point in 3D space with its own properties, like velocity, position and mass.

Case study:

DUNCAN BURCH

"RealFlow was used for the 'Strongbow Gold Cider Explosion'," says Duncan Burch, technical director at Lumiere Studios (**www.lumierestudios.co.uk**). Depicting an arrow flying into a bottle of cider and seeing it explode was always going to be a challenge, but Burch was happy to use RealFlow. He explains: "From previous projects we knew it was the only choice! We have RealFlow integrated strongly into our pipeline. Any project that enables us to use RealFlow (with Maxwell Render), we are excited by."

Burch continues: "There were about ten different simulations in the end to create various elements throughout the shot. Some were needed for the really fine spray that shoots off in all directions and others for the more gloopier stuff in the middle. There were also separate simulations for the arrow's impact and the trails it leaves behind as it continues its journey. The client was very particular about the areas of fluids and explosions [required], so we had to find a controllable way of splitting apart the simulation into key/controllable areas. This allowed us to focus on certain areas [and] it was much quicker to [work in] sections."

REALFLOW

Website www.nextlimit.com
Price £2,487 approx* /$3,995 US

Fluids / Rigid bodies / Soft bodies

MAYA

What does it do?

This animation package also features a host of VFX tools, including nParticles. You can create a whole range of effects with the program and it has bi-direction interaction with nCloth and nHair, meaning that the particles can affect the cloth/hair and vice versa, completely simultaneously. The Fluid Effects tool is also powerful and comes with a wide range of presets – including clouds, smoke, snow, steam, fog, nuclear explosions, flames, lava, mercury, mud and much more – so you're really able to start one step ahead.

Case study:

SURAJ HARRINGTON-ODEDRA

Head of Maya development at The Mill (**http://themill.com**) (and graduate of Escape Studios), Suraj Harrington-Odedra, recently worked on a spot for Mercedes. "There was one shot in the original edit that contained a particularly striking view of the car," he says. "But it was filmed on a domestic road in Los Angeles, so it didn't really fit with the rest of the edit", which took place in a studio that was darkly lit for the most part.

Harrington-Odedra's task was to "replace the environment around the car to match the rest of the commercial. However, we quickly realised that this wouldn't be possible as we'd have to replace all of the rolling reflections on the car as well. As a result, the decision was made to produce the shot in full CG".

Autodesk® **Maya**®

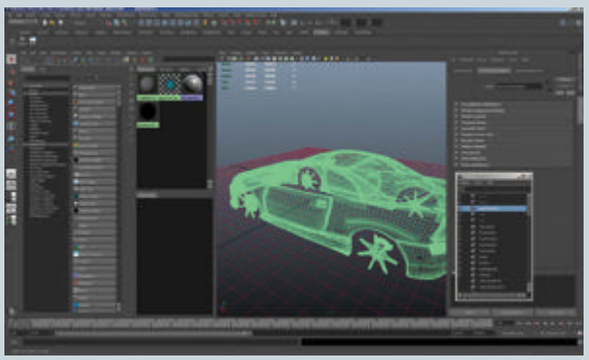
Website www.autodesk.com
Price £2,900/$3,675 US

Particles / Fluids / Hair / Cloth

After the car was re-created in Maya, Harrington-Odedra's challenge was "to realistically render the A-Class (the car) so that it would fit into the rest of the edit. Solid Angle's Arnold was used in Maya to photorealistically light and render the environment and the vehicle. The principle reasons for the use of Arnold were to take advantage of its incredibly fast raytracing engine, which enables extremely rapid turnarounds... In the final renders, 3D motion blur and depth of field were used to enhance the photographic feel of the shot... We were able to turn the shot around in just five days".

© The Mill/Mercedes

The Mill worked on a Mercedes advert with a lot of "sweeping camera moves that show off the contours of the new A-Class while it is racing around a darkly lit, wet studio floor", says Harrington-Odedra



CAD data was supplied by Mercedes, which the modellers used to re-create the car. "Our generic Maya car rig served us well and this work was completed in less than a few hours," notes Harrington-Odedra

Know your VFX tools

'Tempo' is the latest film from Seth Worley, created for Red Giant Software to show off its plug-ins
© Red Giant Software

AFTER EFFECTS

What does it do?

Part of Adobe's Creative Suite, After Effects of course plays nicely with Premiere Pro, Illustrator and Photoshop. Motion graphics and interactive design are two things the program does well, while visual effects and compositing are certainly possible too. There's a whole host of FX plug-ins that are compatible – including those from Red Giant Software and Digieffects – and the software offers a 3D camera-tracker with the ability to include raytraced, extruded text and shape layers in 3D space. The latest version also boasts what it calls Global Performance Cache, which uses your computer hardware to render faster than before.

Case study:
SETH WORLEY

For 'Tempo' by Seth Worley (**http://sethworley.com**), a scene featuring a grenade was the biggest challenge. "Real-looking fire is extremely difficult to pull off synthetically. You usually have to rely on stock material, which doesn't give you a lot of control. Since it was a slow-motion explosion in a real-time environment, with real-time action going on around it, it had even higher potential for looking unbelievable and fake," Worley says.

Fire was created "using a combination of Trapcode Particular (by Red Giant) and stock footage. We used footage from Digital Juice's compositor's toolkit. The workflow included a killer setup for slow-motion fire... To sell the effects, we added real-time elements like smoke and turbulent displacement for heat, and a flickering flare at the core of the explosion", Worley adds.

Website www.adobe.com
Price £991/$999 US

Compositing / Motion graphics / Camera tracking

Worley used a raft of plug-ins, including Trapcode Particular, Knoll Light Factory, Magic Bullet Colorista II, Primatte and Key Correct for keying, as well as Element 3D. After Effects' new Global Performance Cache ensured it all ran smoothly

Autodesk® **3ds Max**®

Website www.autodesk.com
Price £2,900/$3,675 US

Particles / Fluids / Hair / Cloth

"In the beginning I had bars of chocolate all over my desk and by the end there were only empty boxes," says Chris Chui of his work for Cadbury
© Cadbury/Lightfarm Studios

3ds Max

What does it do?

An industry-standard for modelling, animation and rendering, this tool doesn't make effects too complicated, enabling you to concentrate on what matters. There are many additions to the MassFX unified system of simulation solvers in the 2012 edition, with one highlight being a new mCloth module. This includes tearable fabric and support for dynamic ragdoll hierarchies. The program has increased compatibility with After Effects and Photoshop, with the ability to perform simple compositing within the software using a schematic, node-based interface.

Case study:
CHRIS CHUI

Lightfarm Studios (**www.lightfarmstudios.com**) has worked for Cadbury many times. Chris Chui, a CGI generalist on the team, was tasked with combining photos of chocolate and caramel with his own creation of them. He says he tries "to model with a low-res cage as much as possible. I always work with the end result toggled on and off while doing my hard-surface models, adding loops where [required]. I also model with a highly reflective shader on my models to spot pinches and so on".

Lighting was crucial when it came to unifying the elements: "I let my HDRI cast reflections on the objects for realism, while I use the plane lights for cool highlights. When shading, I like to build my shaders in layers, analyse the material and imagine all the components in a material, for instance: a clear coat on top of car paint and so on."

3ds Max's HDR-capable compositor means you have complete control when combining high-res renders and live-action footage

phoenix fluid dynamics

Website www.chaosgroup.com
Price £600/$960 US

Fluids / Fire / Smoke

PHOENIX FD

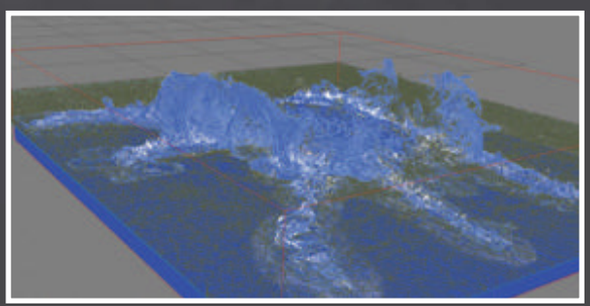
What does it do?

Phoenix FD (originally for 3ds Max, but now for Maya as well) is a fluid dynamics plug-in, meaning that it can handle all kinds of water, fire and smoke simulations. To make those look even more realistic, it can also generate the particles for the foam and splashes that go along with them. Linear and angular winds can also be simulated on moving objects, such as fireballs. Such is the detail with which you can run these simulations, that implicit surfaces created by your Phoenix FD objects can be the source of further simulations, which enables the VFX artist to create complex FX, like burning liquids or water vapour.

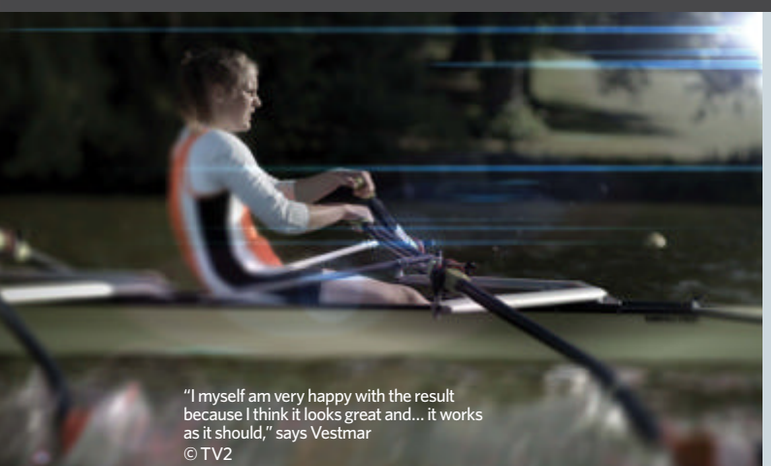
Case study:
TOMMI SAARISTORANTA

Tommi Saaristoranta works for Trix (**www.trix.fi**), a VFX company in Helsinki, Finland that recently used Phoenix FD for a Radio Rock commercial spot. He explains that the team needed to produce "a certain type of smoke, which was almost impossible to create on-set. In this case, we needed to have a huge explosion inside a room, but with no resulting flame effects at all. With Phoenix, I created a few different types of smoke and this big explosion. It was easy to create many iterations of thick smoke and let the [client] approve the look. The hardest part was creating a time ramp for the explosion. In Phoenix we have great tools for controlling the fluid's advection, but it was too hard to accomplish it within the simulation, so we decided to complete it in the composition".

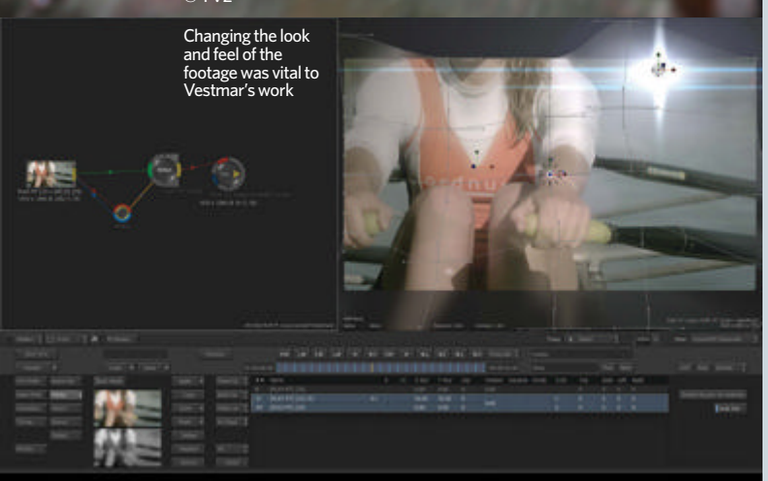
"With the V-Ray render engine and great customer support, I'm happy to use Phoenix for every smoke, fire and water simulation tasks given to me," says Saaristoranta
© Radio Rock/Trix



Saaristoranta says that although Phoenix doesn't support rigid-body objects at the moment, he is "sure they're coming in the future"



"I myself am very happy with the result because I think it looks great and... it works as it should," says Vestmar
© TV2



Changing the look and feel of the footage was vital to Vestmar's work

SMOKE FOR MAC

What does it do?

Combining a non-linear, video-editing system with a VFX toolset is the idea behind Smoke for Mac. The ConnectFX feature enables you to move from your editing timeline to node-based compositing, with the changes you make being automatically fed back into your edit. Plus, with what it calls the Action Compositing Environment, you can go beyond 2D layer-based compositing. There's a complete set of VFX tools for text, titles, animations motion graphics and so on – with complete control over lighting. Smoke also enables you to create stereoscopic 3D effects.

Case study:
JANNIK VESTMAR

Vestmar (**www.vestmar.org**) worked on a commercial for TV2 in Denmark for the London 2012 Olympics. Vestmar shot the commercial and completed the VFX. He explains: "My task was to make a film that showed the atmosphere of St. Katharine's Dock and to get Olympic athletes as part of the experience..." Vestmar didn't have a huge budget, so spent just a day filming in London to capture some key landmarks. "We then filmed from [the] Euro 2012 [screen] in the middle of Copenhagen, as it was almost the same setup [as the screen for the] Olympic Games in London."

To achieve the overall look of the piece, Vestmar "used Smoke for Mac for lighting effects, lens flare, colour grading and VFX with extra defocus". To try to make it seem more expensive than it was, he also used chroma-keying and some matte-painting to help turn Copenhagen into London.

Autodesk® **Smoke**®

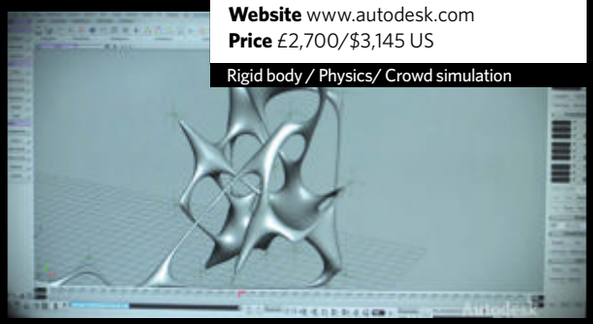
Website www.autodesk.com
Price £3,200 / $3,495 US

3D motion graphics / Stereoscopic 3D

Know your VFX tools

Creating fluid that had to be projection-mapped was a big challenge, but Softimage gave the right control
© Skillrex/Leviathan

Softimage gave the team the power to shape the fluid effects, rather than "rely on chaotic or random forces"



Autodesk® Softimage®

Website www.autodesk.com
Price £2,700/$3,145 US

Rigid body / Physics/ Crowd simulation

SOFTIMAGE

What does it do?

Working alongside Maya and 3ds Max in the Autodesk Entertainment Creation Suite, Softimage enables you to hone in on character animation, procedural models, advanced simulations and effects. The latest edition of the software includes crowd simulation. Using Softimage's ICE (Interactive Creative Environment) you can create complex effects with a massive amount of characters, all of whom react intelligently to their environment and one another. The Bullet physics engine has also been integrated into ICE and the new Actual Shape Collision options means that you can use deforming meshes for far more-accurate simulations.

Case study:
BRADON WEBB

Bradon Webb, creative director at Leviathan (**www.lvthn.com**), led the team using Softimage to do VFX production for Skrillex's Mothership Tour.

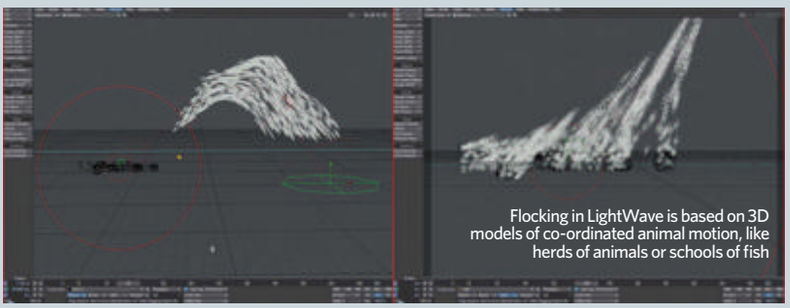
"We turned to Softimage because of the ICE node editor," explains Webb. "This allowed us to create particle simulations or things that looked very fluid in nature but without having to wait for the traditionally long simulation times. Another reason we chose ICE was because it would allow us to heavily art-direct the fluid. Instead of relying on chaotic or random forces, we could specifically direct and shape the fluid using spline tools, meshes and a series of nodes to build up our layer effects. A specific plug-in we made use of to mesh the particles and give a fluid look was emPoligonizer. This allowed us metaball threshold-meshing and tolerance controls that were very fast and could often be played back in real time."

Webb and his team also had to keep a high level of control because they "were not just creating a rendering of the fluid, but projection-mapping it onto structures on-stage. We wanted the illusion that the fluid was a three-dimensional object on the stage. The fluid had to react to the surface of the stage in certain ways – at times colliding, conforming or attracting".

LIGHTWAVE

What does it do?

LightWave certainly packs a lot of tools under the hood. Your 3D rigid-body dynamics can be handled by Bullet, which can be accessed directly from the Layout and used with the Fracture tool to collapse buildings and create explosions. Particle work – smoke, fire and so on – can be created by HyperVoxels and works alongside ParticleFX. Then there's the FiberFX tools for the creation of hair, fur, feathers and so on. LightWave also has a Flock tool to create anything from a swarm of insects to an invasion of alien spacecraft. The latest version enables you to create truly natural-looking results.



Flocking in LightWave is based on 3D models of co-ordinated animal motion, like herds of animals or schools of fish

Case study:

GARY HUTZEL

Battlestar Galactica: Blood & Chrome is a new prequel shot entirely with a greenscreen. The huge undertaking was led by Gary Hutzel, the VFX supervisor at Universal Cable Productions. "LightWave is my primary choice for television because it's a tool that is artist-dependent, not pipeline-dependent. LightWave is an all-in-one 3D solution that requires little or no third-party plug-ins or additional software. It's a complete tool that provides the individual artist tremendous control over his or her work. For me, LightWave provides a short, fat pipeline where very few can individually handle each shot very quickly," he explains.

Rather than farming different VFX shots out to VFX houses, Hutzel led a team that worked in-house. The greenscreen enabled them to revisit Galactica, but expand the ship outwards from what the physical sets could show.

"A typical shot will receive a 3D track from SynthEyes," says Hutzel. "[This] imports directly into LightWave. The principle artist imports the 3D background model built in LightWave... and lights the scene. This is then passed along to break out and render before going to final comp... It's not unusual for a complex scene, including character animation and 3D environments, to be pre-visualised, animated and even comped by the same individual. This process provides the kind of amazing efficiency necessary to complete a show like *Blood and Chrome*, for which we completed over 1,800 shots in five months."

LightWave 11

Website www.lightwave3d.com
Price £1,130/$1,495 US

Particles / Rigid body / Fluids

© Filippo Veniero, www.ifilgood.it

VFX FOR FREE

Create impressive effects with open-source software

The free, open-source, 3D-creation suite Blender released an update at the end of 2012, with the focus on presenting a polished VFX pipeline. It now features motion tracking using a planar system, improved greenscreen keying and colour management. A new tile-based compositing feature has also been added. Visit **www.blender.org**.

TRAPCODE PARTICULAR

Make your particles explode with life

TRY TRAPCODE SUITE 12 – **FREE** WITH THE DISC, **PLUS A SPECIAL 20% READER DISCOUNT!**

This After Effects plug-in has become the industry standard and was used on films like *Spider-Man 3* and *Angels & Demons*. You can create anything from clouds and bubbles to snow and smoke with its powerful controls, all accessed within After Effects. The latest update enables full 3D rotation and expanded support for turbulence and air resistance. Visit **www.redgiantsoftware.com.**

© Red Giant Software

THE TOOLS ARE JUST THE BEGINNING

In the past, VFX were typically completed on dedicated hardware, where films would have shots parcelled out to different companies and operators could work on a Flame or an Inferno machine. As our computers and software have improved, world-class effects can now be created from the desktop. Indeed, as well as the programs listed here, others can get in on the act. Photoshop, for instance, can be a vital tool, as can Mudbox and modo, ZBrush, Fusion and many more.

Remember, the software and all the hardware are only tools. The important thing when it comes to VFX – as in any other area of artistic endeavour – is that it's only there to realise what you can imagine, or what you see before you and want to replicate. A good eye, great imagination and attention to detail are all as important as knowing your software packages inside out.

As writer, director and general After Effects-whizz Seth Worley explains: "Usually when I sit down to write, I either have a cool idea for a sequence with a decent notion of how to achieve it, or I have a specific effect with an established solution that I want to try out. But every now and then I'll get an idea for a sequence that I have no idea how to pull off convincingly." In a nutshell, that's what makes working in visual effects so exciting!

With the Disc

Tutorial files:

- Marmoset scene files & maps
- Custom stencils
- Configurations for map extractions in Mudbox
- Tutorial screenshots

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Luís Santos

Personal portfolio site www.luissantos.net

Location Portugal

Software used LightWave, Mudbox, Photoshop, nDo2, Marmoset Toolbag

Expertise Luís specialises in character modelling, sculpting and texturing

Concept

I thoroughly enjoy serious-looking yet stylised characters, which was the precise aim for this artwork. I preceded the modelling stage with photo research focused on the veiled chameleon species, in order to achieve realistically detailed features.

Software used in this piece

LightWave | Mudbox | Photoshop | nDo2 | Marmoset Toolbag

Retopology tips

LightWave is packed with useful tools to correct and optimise topology, such as SpinQuad, BandGlue, Extend and Weld. But there are also a few plug-ins that can be helpful, too:

• **Sketch Mesh** – like a 3D tracing-paper tool, it allows you to redraw the surface of underlying layers and objects on a new layer. From the menu button you can draw strokes to delimit the area of the surface you wish to redraw. The level of detail and surface limits are defined by your strokes. Download for free via **http://tinyurl.com/SketchMesh**.

• **Add Edges** – Add, remove and reposition edges along the surface of your object. Your object will show a multitude of markers; just 'connect the dots' to achieve new edges. Download for free from **http://tinyurl.com/AddEdges.**

• **BandSaw EX** – Ideal to achieve new loops. Select two adjacent polygons and click BandSaw Ex; a new loop will be created, which you can slide towards the position you desire. Download for free via **http://tinyurl.com/BandSawEX.**

Eye-catching texture

Trippy, the Chameleon 2013

"Achieve a character ready for a close-up, complete with finely sculpted details and textures"

Luís Santos is a character modeller and texture artist

This tutorial will guide you through the entire process of modelling, sculpting, texturing and rendering a chameleon character with a high level of detail. First you'll work out what the building blocks for the base mesh of the model will be. Second, I'll guide you through the creation of custom organic stencils, which will enable you to sculpt rich and varied details for the skin. You will learn which tools can easily be used to refine your sculpt and blend in the different details. I'll also show you how you can use Mudbox to easily pose your model for different shots. Next up, I'll expose the process of unwrapping UV layouts and extracting Normal, Displacement and Occlusion maps from your model. You will also learn how to convert a Normal map into a Cavity map with the help of the nDo2 plug-in for Photoshop. Finally, you'll get to know Marmoset Toolbag's real-time rendering engine and learn how to set up a basic scene and define useful material and lighting properties.

Learn how to

- ☑ Gather suitable references for added realism
- ☑ Block out the base mesh for the model
- ☑ Create organic stencils for digital sculpting
- ☑ Refine the model with sculpting tools
- ☑ Pose your model for the optimal position
- ☑ Extract Normal, Occlusion and Displacement maps
- ☑ Convert a Normal map into an enhanced Cavity map
- ☑ Paint textures on a layered setup for different channels
- ☑ Set up a scene and configure lighting preferences
- ☑ Finish up with some post-production

Start with the basics

Define your model in LightWave

01 Do your homework As with all artwork, research plays an important role in defining your goals and identifying your challenges. Given the specificities of the subject, you should carefully pick your references in order to get a good feeling of form, weight, common qualities and intricate features. For a start, any search engine will provide you with plentiful photo references of chameleons. You'll want to roam free with your creativity, but picking a particular gender and subspecies will provide your creation with consistency for those who know this creature well. However, the balance you strike between realism and artistic license is of course completely up to you Ⓐ.

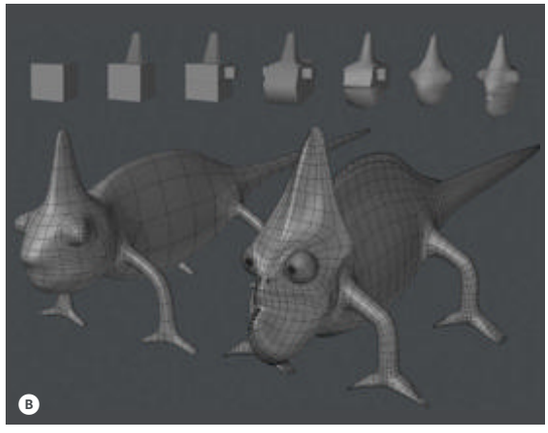
02 Born from a box Darwin's *On the Origin of Species* will tell you that a chameleon should come from an egg. Well, Trippy, our chameleon friend, comes from a box in LightWave. Evolving from this basic object enables us to quickly form the rough volumes that comprise the character. We'll employ basic and well-known tools such as Extrude, Extend, Spinquad and Mirror, while not being too concerned with exact proportions at this stage. However, do prepare a few appropriate loops for the limb articulations, the eyes and the mouth limits, which should be refined in a later step. After a few fixes regarding topology, you should have a base mesh that serves its purpose and keeps the potential to be aesthetically pleasing when refined Ⓑ.

Model what will be seen

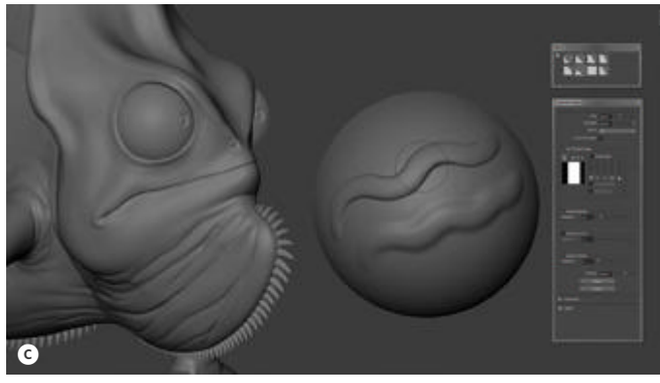
As soon as you lay eyes on Trippy, I'm sure the thought of a really long, slimy tongue crosses your mind and you may wonder what the inside of his mouth looks like. I'll give you a hint: nothing! Whenever you're assigned a project where your characters will be presented in a 3D-illustration format, or in a very limited animated piece, make sure you settle your scope of work beforehand and agree on which parts will never be seen or used in animation. This will keep your model as light as possible and will enable you to allocate your attention to what really matters.

03 From base mesh to sculpt After settling for a base mesh, import it into Mudbox and start sculpting the general forms that perfect the rough model. You may feel drawn to sculpting the chin's skin intricacies early on, so to achieve these features only use the Wax brush with the bw_strip stamp. You can experiment with the default brush without the stamp to realise the difference in results. To better control the affected areas, try locking all the objects or sections that you don't want to accidentally sculpt. Go to the Object list and click on the lock near each of the objects you wish to protect Ⓒ.

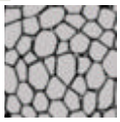
Ⓐ A photo reference of a veiled chameleon sitting in a tree, available on Dreamstime.com



Ⓑ The step-by-step evolution of the base mesh

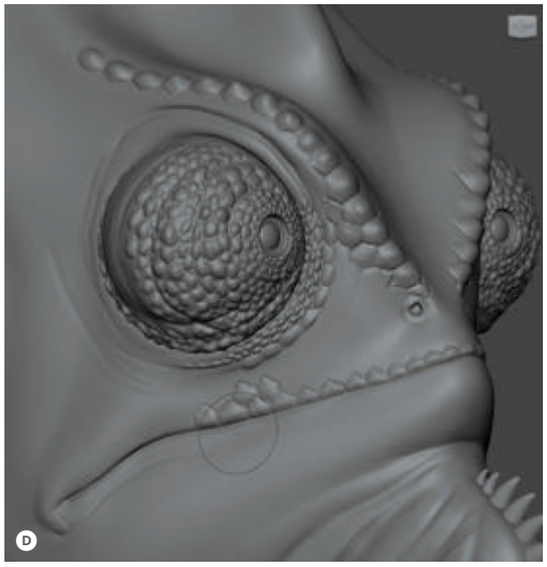


Ⓒ The early sculpt sided by the Wax tool, shown with and without the stamp



Build up the details in Mudbox

Create custom organic stencils and apply intricate features



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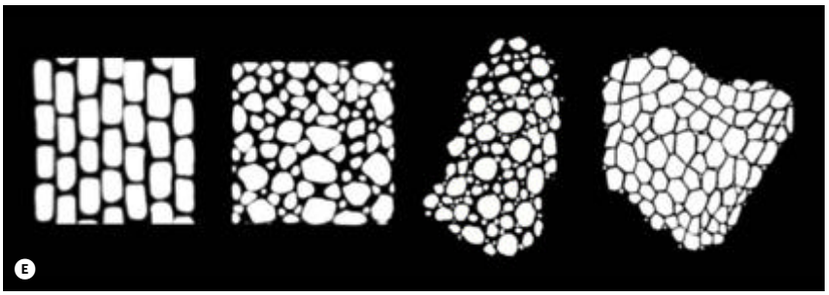

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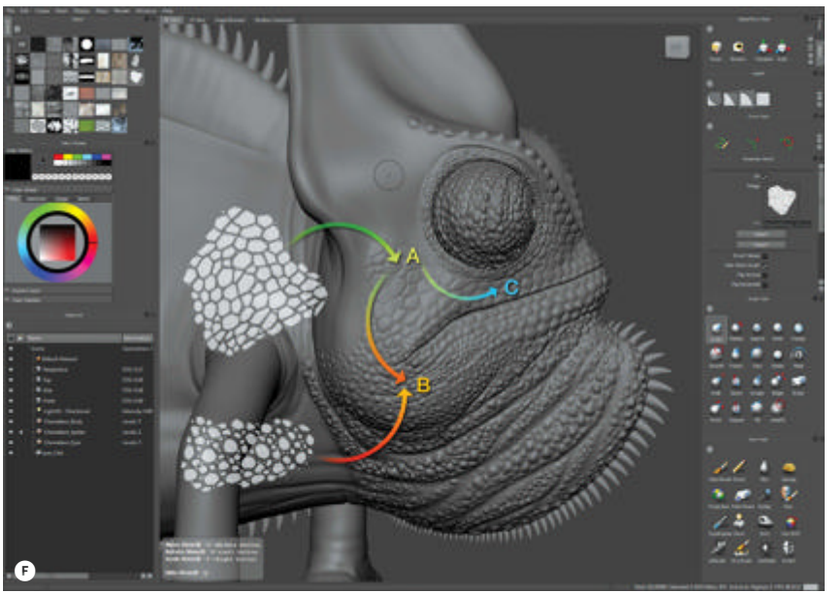


F

04 Learn your sculpting tools The Knife tool and Wax brush are used frequently throughout the sculpting phase. The sharpness of the Knife tool satisfies tasks such as the tooth-like patterns surrounding the mouth. Features such as the eyebrow patterns and the details near the eyes are the result of alternating between the Wax brush and the Knife tool D.

05 Customise organic stencils The most eye-catching skin details are achieved through custom-made stencils, which can be prepared manually in Photoshop (the ones used here are supplied with this tutorial). To create your own, find a few photo close-ups of chameleon scales to work from. For each reference, create a new file with a transparent background, a layer for the reference and a top layer to paint over. Paint the emphasised forms in white and save as a PNG without the reference layer, as shown. While in Mudbox, find the Stencil tray, click the right arrow on top, choose Add Stencil and load your stencil images E.

D Close-up of the mouth and eyes in progress

E Line-up of all the custom stencils

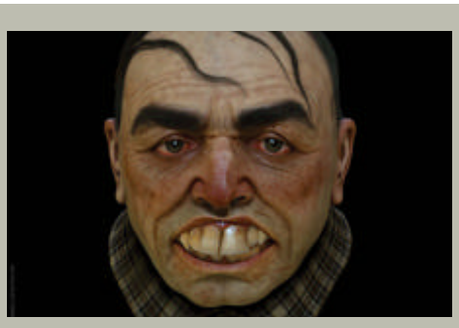
F Flow and blend between the stencil details

06 Go with the flow & blend in You should scale and rotate your stencil according to the natural flow of the skin intricacies. An automatic repetition (pattern) will not produce realistic results and so will appear much less organic. Pay close attention to the types of scales that are adequate for each area. To achieve a nice blend between different styles, you can choose to leave some blank areas between them and fill them in with custom-sculpted details. You will achieve different results according to the tool you have selected in the Sculpt Tools tray, but Sculpt was used for Trippy (the first icon on the tray). After applying the stencil, use the Wax tool to make a few sporadic spots stand out. As you can probably tell, this stage will very much depend on the result you're trying to achieve, so it's best to find your own preference when applying these details F.

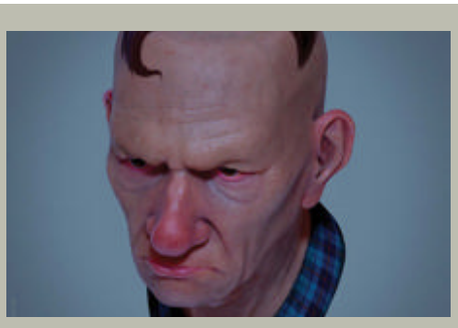
Artist Showcase

Luís Santos

Since a very early age, Luís has been interested in strange concepts. He started by drawing and painting, but emerging technologies opened a door he refused to close. He takes the greatest pleasure from developing characters with strong personalities and intricate, slightly uncommon features.



Talhante **LightWave, Mudbox, ZBrush, FPrime, Photoshop (2005)**
An old-school Portuguese butcher, complete with some arresting features!



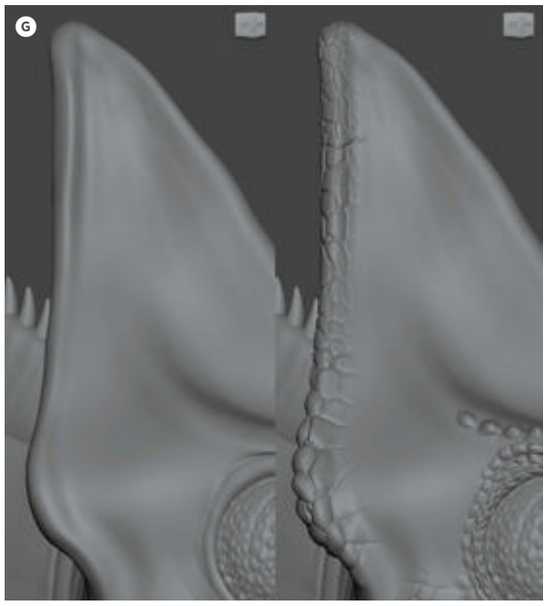
Edsel Flat **LightWave, Mudbox, FPrime, Photoshop (2011)**
AKA Flat Ed, a lawn-mower collector who is also a massive plotter of flat concepts

07 Keep refining & building detail

The Knife tool provides a means of sharpening the stencil's results. A few well-positioned strokes can deepen the skin wrinkles and define prominent details. The head and casque are also sculpted with the Wax and Knife tools to achieve a well-defined silhouette for the model. Start with a higher intensity and soften the application towards the top. A stencil can also be applied G.

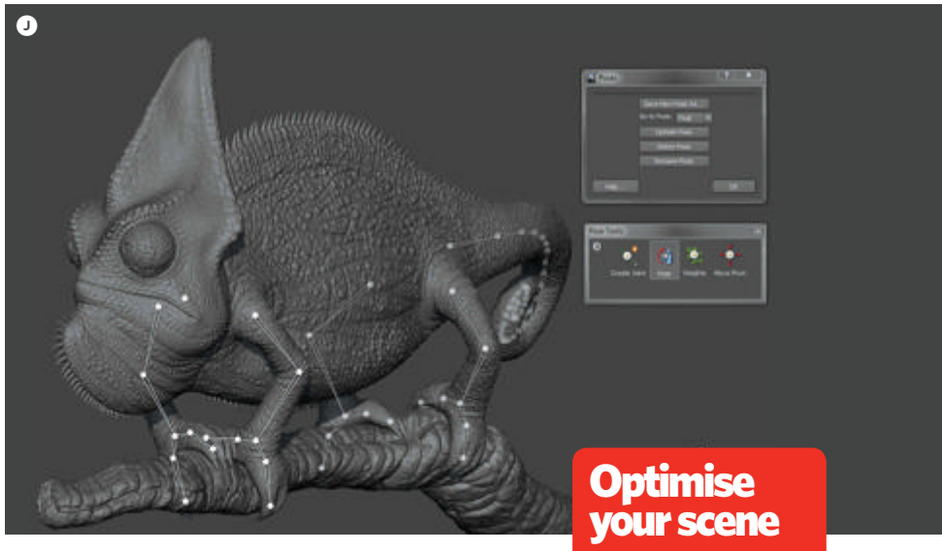
08 Finish the details

These methods are also sufficient to achieve the sculpted details for the body and limbs. Always keep a natural flow for the skin while minding articulations, creases and volume oscillations. Use the brick-wall-like stencil to sculpt the tail with a gradual blend towards the body's scales. The corn-like stencil is used to sculpt the feet soles H.



09 Maintain the balance

We'll now model and sculpt a simple branch for the chameleon to stand on. This is built using the bw_skin02 stencil and some custom details. Feel free to be more creative regarding small protruding leaves or even add little critters to enrich your piece I.

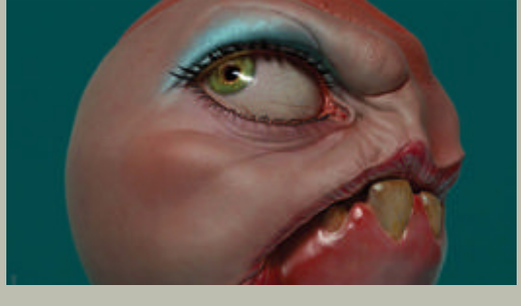


G Before and after the casque-refinement steps

H A worm's-eye view of the sculpture so far

I The sculpted branch

J The model's final skeleton in a suitable pose



Mrs. Pacman **LightWave, Mudbox, FPrime, Photoshop (2011)**
A strange interpretation of the retro character Pacman's 8-bit wife, quite typical of Luís' unique style

10 Strike a pose

You can use Mudbox's Pose tools for a minimalist approach to posing. Let's be clear on the fact that this is not the equivalent of rigging, but it will provide you with the basic means to deform the model and achieve a simple pose variation, which suits our goals for this particular work. The skeleton of the pose will be automatically placed on a homonymous layer as soon as you create your first joint. Before actually creating any joints, make sure you deselect the One Joint at a Time property so that each new joint connects to the previous one. Upon selecting a joint, the Weights tool enables you to customise the way pose transformations affect the object. Our chameleon has one joint on the neck with weights extended all the way to the head. To make sure these weights affect the eyes and spikes, select them immediately after creating the joint. Select the Weights tool, apply 100% Strength in the Properties tray and click the Flood button on the bottom. You should be able to move the whole head without leaving the eyes or the spikes behind. You may choose to create their joints with the Mirror property set to X. The tail holds many joints to achieve its curvature. Once you're happy with a pose, you can save it for reference (Windows>Poses) J.

Optimise your scene

I tend to mention this whenever I have the chance, because I can't stress its utility enough: if you get carried away with sculpting and texturing in Mudbox, you might quickly run out of memory and experience slowdowns. To avoid this, hide the areas that you are not currently painting. You may also select specific tiles/layouts and unload their textures from VRAM by pressing the up and down arrow keys. Freeing VRAM will usually reflect in a performance boost.

Unwrap & extract

Unpack your UVs & remove maps with your sculpted details

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nDo2 TRIAL
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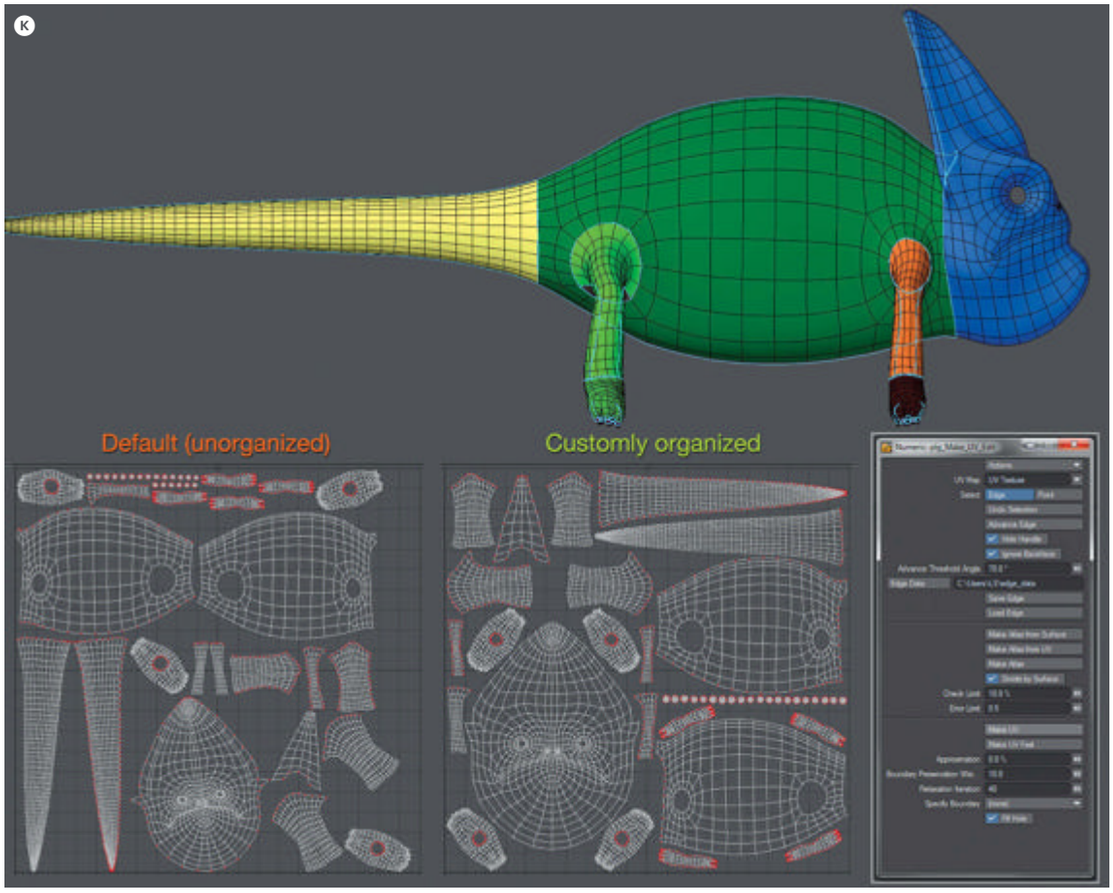
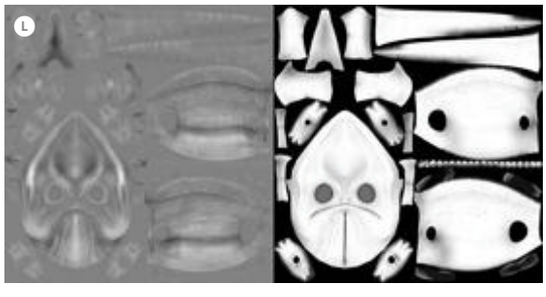


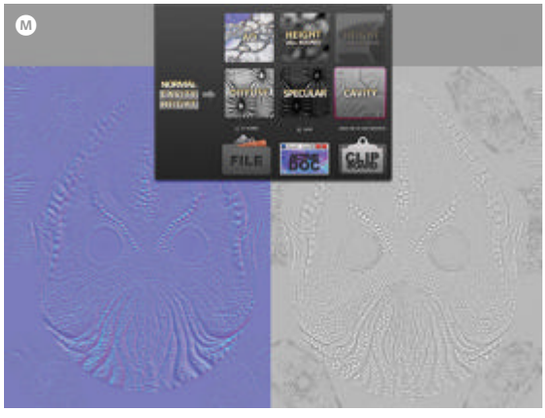
11 Apply LightWave UV layouts

PLG_Make_UV_Edit is a free plug-in (**www.cglounge.com/plugins/plg-make-uv-edit**) that enables you to easily unwrap your UVs in LightWave Modeler. Select a surface that you wish to unwrap and press the Q key to trigger the Change Surface window. After specifying each surface properly, open the plug-in's interface and click Make Atlas From Surface, which will show you the edges of each surface, then click Make UV. You may use the Move and Rotate tools to compose a neatly organised map. The spikes that compose the crests are unwrapped differently. Use the plug-in to select each spike's centre edge and then click on Advance Edge. After doing this for all spikes you just have to select all of the edges and Make UV to attain their shells. This piece comprises a total of five UV layouts: the full body minus the eyes, the eyes (separately), the chin crest, the body crest and the supporting branch K.



12 Mudbox maps

Mudbox enables you to sculpt first and take care of the UVs after. Choose File>Import UV, while making sure that your object is set to the base subdivision level (Level 0, which can be attained by pressing the Page Down key). As long as you haven't edited the object in any way that might have changed the number of vertices, you can select the Match by: Vertex ID import option. After doing this for each object (in regards to each UV layout), you are ready to extract your maps for each object with its own UV layout. Use the Select/Move tools to make sure your desired object is fully selected (marked in yellow). Select Maps>Extract Texture maps>Normal map. For the Extraction Options, make sure you click the Add Selected button near the Target Model and Source Model boxes. Refer to the supplied screenshot named 'maps_extraction_config.jpg' for the remaining extraction configurations. Follow the same procedure to extract the Displacement and Occlusion maps (Mudbox will recall your previous configurations). The Occlusion map requires a specific Advanced>Filter property configuration: set it to 0.001000 L.



13 Photoshop & nDo2 Cavity maps

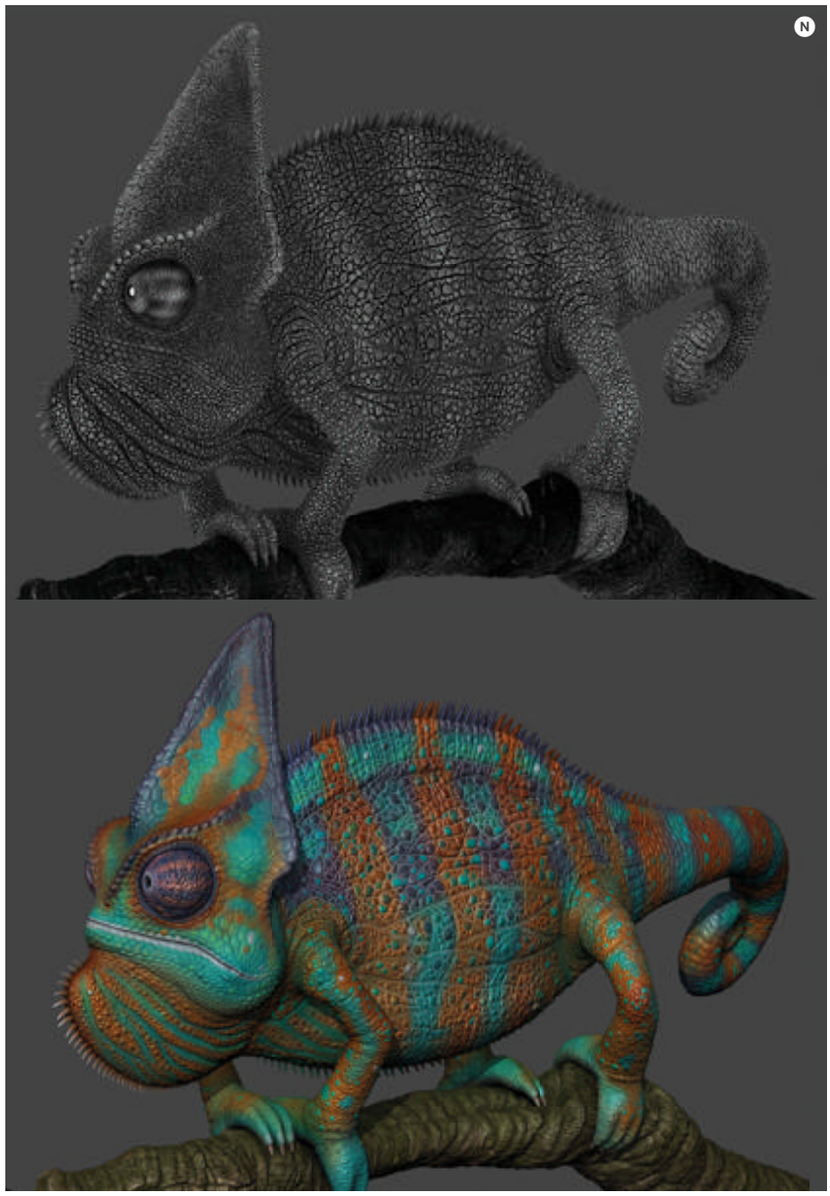
nDo2 is a Photoshop plug-in created by Quixel (**http://quixel.se**), which enables you to enhance your Normal maps. Featuring many options and presets, this plug-in is particularly useful in the videogame industry. You can use this plug-in to convert a Normal map into a Cavity map. Open the plug-in's interface and then your Normal map files in Photoshop as well. Click the small Convert... link in nDo2, define Normal as your Origin, Cavity as your Target, then click Active Doc. The plug-in does a great job of picking up on slight sculpting nuances, which are a perfect base for Specular and Diffuse maps. After a few tweaks to the exposure, the Cavity map is ready to go. Get better acquainted with nDo2's potential with the free trial supplied, or visit **http://quixel.se/ndo** M.

Transferring paint layers in Mudbox

Consider that you are working on a videogame production environment and you've started texturing an asset. A client request could bring radical changes to the UVs, but Mudbox has a nifty feature named 'Transfer Paint Layers', which enables you to transfer colour from one model to another (preferably similar). You won't just be transferring a baked result, you will have all of your paint layers' structure rebuilt onto the new model. All you need to do is select Maps>Extract Texture Maps>New Operation and click Transfer Paint Layers on the emerging window. Mudbox documents clearly explain all of the possible transfer scenarios, so read these.

Create detailed textures

Use paint tools and your extracted maps to achieve the final textures



14 Paint layers & channel tips Mudbox enables us to work with separate paint layers. Always keep your colour scheme flexible by painting each colour onto a distinct layer. This means you can adjust each colour area's hue, saturation and brightness at any stage without affecting the remaining areas. Here we've adorned Trippy with turquoise, purple and orange tones as the main colour scheme. The painting process itself is straightforward: use the Paintbrush tool for colouring and the Paint Erase brush for corrections. To achieve the glossy irises, paint one layer with jet black, then duplicate it (Ctrl/right-click then pick Duplicate Selected). On the Layers panel, create a New Layer with Channel as Specular. Repeat the process for the Gloss channel and drag your duplicated layer to the top of the newly shown Specular channel. Ctrl/right-click this layer, then choose Adjust Color>Select a Preset>Inverse. This results in an intense and unique shine. Now duplicate this specular layer and drag the result to the top of the Gloss channel N.

15 Apply maps to textures The Paint Tools tray enables you to import a layer from an image. Import the Cavity map as a layer for the Diffuse channel and place it on top of all other paint layers. This is the main channel for all the coloured paint layers. Ctrl/right-click the Cavity map layer and choose Adjust Color>Select a Preset>Inverse. Now that your cavities are white, apply the Overlay Blend Mode with 35% Opacity and you'll achieve a reptilian look for the skin's intricacies. Import your Occlusion map into another layer and set it to Multiply Blend Mode to achieve soft volumetric shadows, including the contact shadows between the feet and the branch. Any layers that you create within the Specular channel will affect the shininess of the underlying objects. Bright paint will result in a shiny area, whereas black will result in a matte area. Here we duplicate various layers from the Diffuse channel: drag the duplicates to the Specular channel, convert them to greyscale and then slightly adjust their contrast values. As a finishing touch, create a noise-like stencil and paint it onto the Specular channel O.

K Colour-coded surfaces, the UV layout before and after custom arrangement and the PLG_Make_UV_Edit plug-in's properties and settings

L A line-up of the Displacement and Occlusion maps

M The Normal map, the nDo2 interface and the Cavity map

N A line-up of the Specular channel's textures – isolated and integrated

O Before and after applying the Cavity map as a layer on top of the diffuse textures

Render in Marmoset

Capture astonishing detail with an affordable game engine

WITH THE DISC:
Marmoset Toolbag trial
plus 20% reader discount!

16 Render in real-time with Marmoset Marmoset Toolbag is a software developed and maintained by Marmoset that empowers artists to render low-poly models in real-time with very high quality (**www.marmoset.co**). Real-time artists who wish to portray their work on a showcase will benefit from this tool's qualities. A recent software update enables the use of Displacement maps with DirectX11 tessellation. The first step is to export your model from Mudbox at subdivision Level 2 in OBJ format. A final round-trip to LightWave Modeler is required to name the final exported object layers: eyes, body, branch, chin crest and body crest. Import your OBJ to Marmoset and notice the Chunks and Material trays. Import your Displacement map (extracted in Step 12) into the Material tab, under Displacement Input. Notice that you have many properties to experiment with, such as Translucency. To soften the edges of your rendered model, scroll to the bottom of the tab and adjust the Tessellation value to 1,000 (this will require a graphics card that supports DirectX11). Incredibly easy to work with, Marmoset comes packed with various lighting presets that are swappable in one click. Select the Light tab and pick your favourite Sky Lighting preset. Given this character's natural habitat, we'll choose Pine Forest. You can adjust the Focus and Depth of Field amounts in the Render tab and tweak the Chromatic Aberration to simulate lens-like effects P.

Painting in 16-bit in Mudbox

When you're working in a production environment that quickly adapts itself to new art-direction goals, you may often find yourself adjusting the hue, saturation and brightness of your textures. However, if you're working with 8-bit layers, you are already restricting your colour ranges. By working with higher-bit-depth layers, such as 16-bit, you'll be entitled to a much larger palette that will provide richer results and noticeable nuances between colours.

17 Post-production in Photoshop Marmoset Toolbag enables us to save screenshots with High Dynamic Range, giving us further control over the colours in Photoshop. You will also be able to export an Alpha channel in order to separate the model from the background. When you open your file in Photoshop you'll realise it's a 32-bit image, which provides you with the means to make colour corrections without losing any of the model's gradients. In this case, Marmoset's output was very satisfying, so there was very little post-processing to be done. If you'd like to indulge in colour-correction adjustments, you can add goal-specific adjustment layers (Layer>New Adjustment Layer) and tweak their values without affecting your image irreversibly. Afterwards, flatten the image to 8-bit and add a Translucent Noise layer (Filter>Noise>Add Noise) Q.

P Screenshot of the Marmoset Toolbag interface while rendering results in real-time

Q A close-up shot of the post-processed noise

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: **www.3dartistonline.com/news/tutorial-files**

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Zombie Playground, Massive Black

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VOLUME TWO

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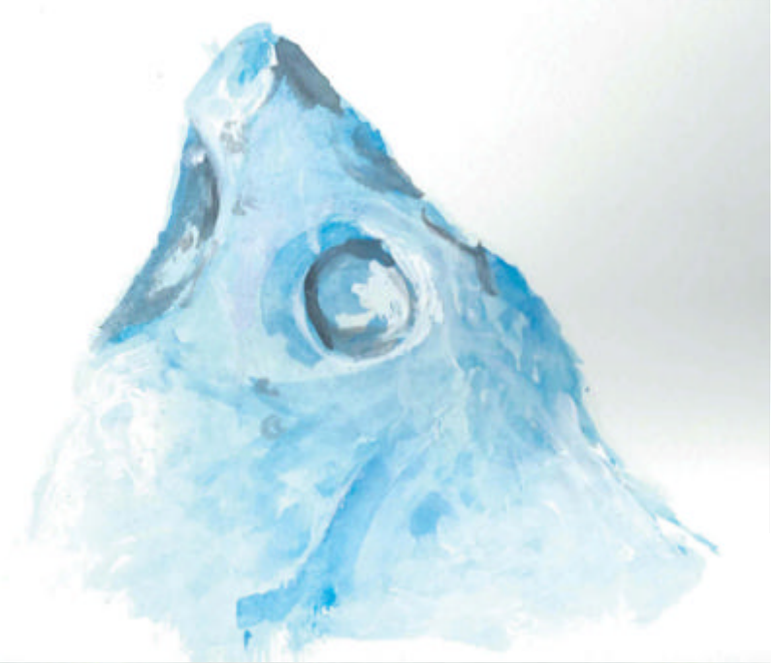
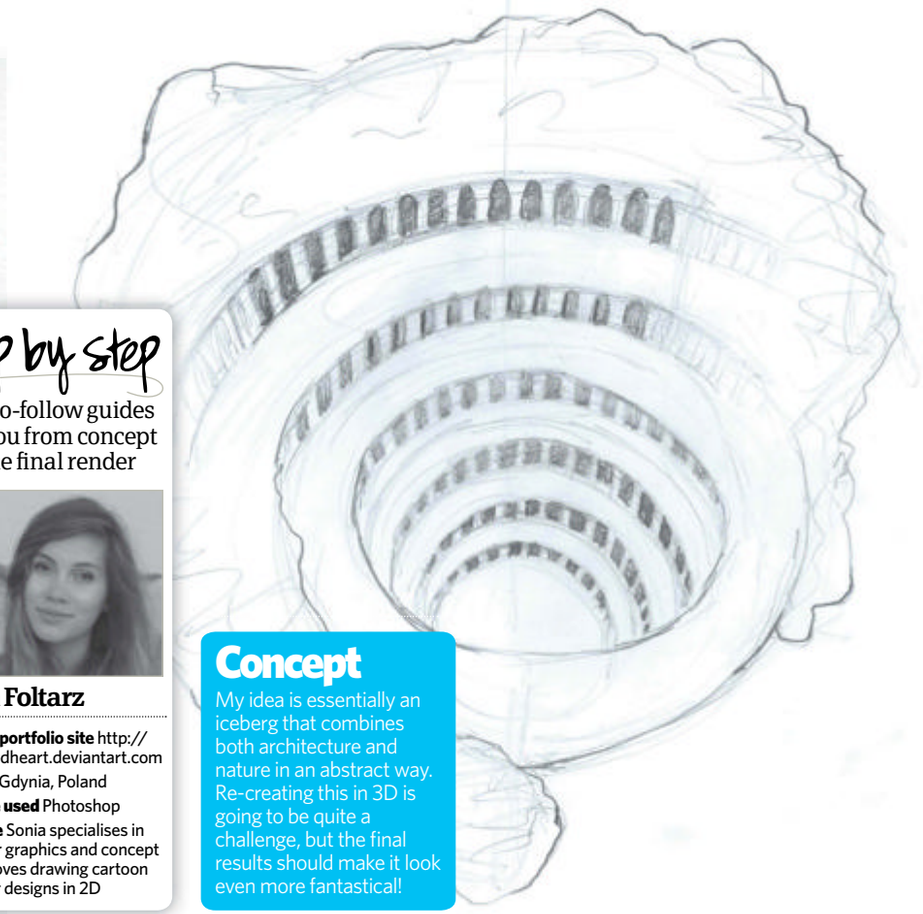




Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Sonia Foltarz

Personal portfolio site http://crystalisedheart.deviantart.com
Location Gdynia, Poland
Software used Photoshop
Expertise Sonia specialises in computer graphics and concept art. She loves drawing cartoon character designs in 2D

Concept

My idea is essentially an iceberg that combines both architecture and nature in an abstract way. Re-creating this in 3D is going to be quite a challenge, but the final results should make it look even more fantastical!

Fantasy arch vis: concept design

Breaking the ice 2012

Sonia Foltarz is a student in Poland currently exploring her concept-design skills to build a portfolio

This concept is about combining architecture and nature in a very abstract way. The design breaks the rules of physics and rational thinking – I doubt an underwater iceberg building could ever actually exist – but that's what makes it so unique and mysterious. It's a great challenge for a 3D artist to take on!

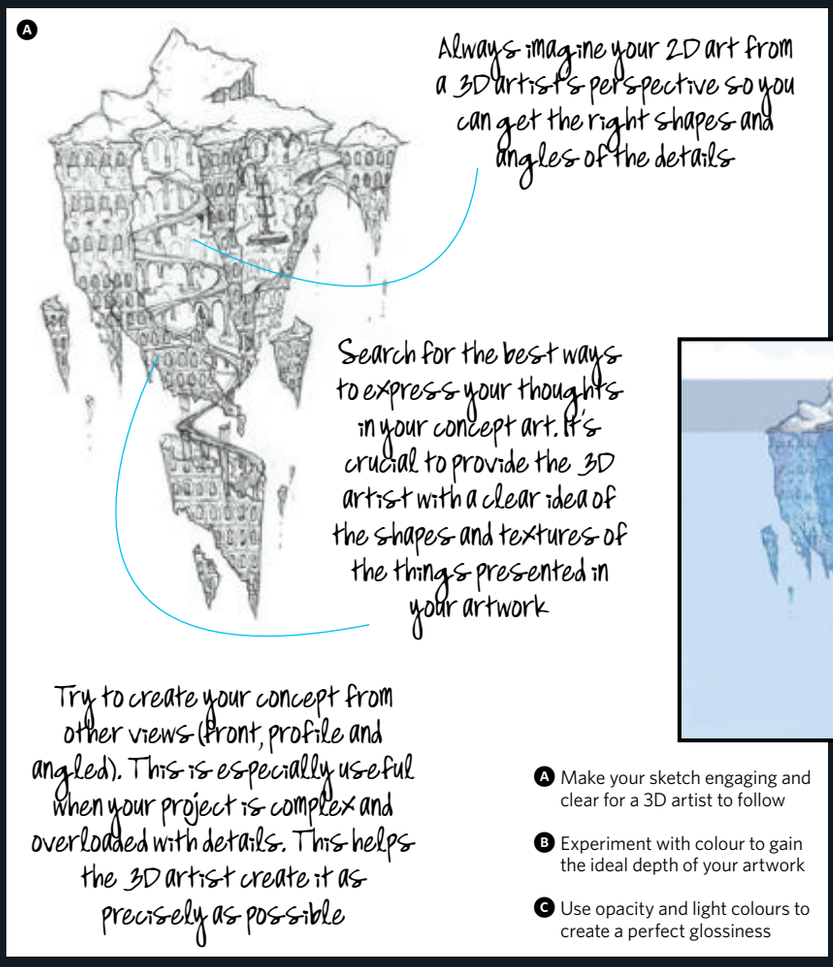
I find it quite difficult to get a perfect icy look when depicting an iceberg, so for this specific effect I use observational skills and experimentation to create textures in Photoshop that work. Another difficulty I encounter while working on this concept is showing the depth of the interior of the iceberg. You'll need to play around with colours and different levels of opacity.

Learn how to

- ☑ Paint simple details
- ☑ Use layer opacity to get an underwater look
- ☑ Achieve depth using colour
- ☑ Construct a concept for a 3D artist to understand

Create a concept

Define your ideas in Photoshop


A
Always imagine your 2D art from a 3D artist's perspective so you can get the right shapes and angles of the details
Search for the best ways to express your thoughts in your concept art. It's crucial to provide the 3D artist with a clear idea of the shapes and textures of the things presented in your artwork
Try to create your concept from other views (front, profile and angled). This is especially useful when your project is complex and overloaded with details. This helps the 3D artist create it as precisely as possible

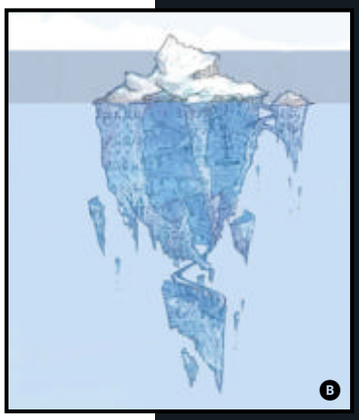
Ⓐ Make your sketch engaging and clear for a 3D artist to follow

Ⓑ Experiment with colour to gain the ideal depth of your artwork

Ⓒ Use opacity and light colours to create a perfect glossiness

01 Research & make sketches To begin, I search for lots of iceberg photos on the internet and decide how I can present the project to be as visually tremendous as possible. After a little trial and error, I decide to go for a front-on view. Thanks to this adjustment I don't need to change the sizes of windows and other small elements because everything is more or less at the same angle. This gives a clear view of my project for the 3D artist to follow Ⓐ.

02 Find the right colours We need to realistically colour our iceberg. I find it useful to take a piece of ice to see how it looks in different surroundings. Then in Photoshop, I divide all levels and layers using foundation colours, which later on help me develop the depth of my piece. The dark-blue tone helps the perspective and demonstrates the complexity of the interior the iceberg Ⓑ.



03 Lighting & particles Lighting is the hardest step in this whole process. Ice has a specific glossiness that makes it look somewhat translucent, so I'm using a wide range of custom brushes and white paint to help me form the details of windows, stairs, columns and a fountain. I later experiment with the opacity of the different layers of my lighting and finally get an icy look that I'm happy with Ⓒ.

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Paweł Podwojewski

Personal portfolio site
http://be.net/simonhc

Location Gdańsk, Poland

Software used
3ds Max, V-Ray, Photoshop

Expertise Paweł specialises in lighting, compositing and optimising scenes

Software used in this piece

3ds Max | V-Ray | Photoshop

Concept

Sonia created lots of quick drawings in search of the best concept. The final sketch was a fusion of a few very different ideas that she explored. The concept looks very complex at first glance and shows lots of details, which is why it's crucial to plan your 3D project from the beginning – especially the modelling stage.

With the Disc

- A crystal shader and model
- A Photoshop file with the basic render elements
- Tutorial screenshots

Fantasy arch vis: 3D illustration

Paweł Podwojewski is an architect with a strong background in CG

This tutorial will show you how use 3ds Max, V-Ray and Photoshop to build a scene from a supplied concept. Following the art provided by the designer, we will create an abstract iceberg structure that combines architecture and nature. This fantasy structure will be an exciting challenge, because the irregular forms and complex geometry will compel us to find ways to optimise our scene.

We'll use Normal Bump maps to enhance the impression of detail in our architectural elements, saving time, poly count and memory. Because 3ds Max doesn't have dedicated sculpting tools, we will also use a couple of tricks and scripts to make things go smoothly. Fractured surfaces can be achieved with a MaxScript and simple modelling tools will enable you to work inside just the one major software.

To add a strong atmosphere to the final image, we'll explore volumetric lights and environmental fog. To finish up, correct use of render elements from V-Ray will help us out in the post-production stage in Photoshop.

Learn how to

- ☑ Plan a scene
- ☑ Prepare concept art for the 3D stage
- ☑ Model in 3ds Max using appropriate reference
- ☑ Create glass and ice shaders
- ☑ Light a scene with V-Ray
- ☑ Improve post-production with render elements
- ☑ Matte-paint in Photoshop for the final touches

Problems & solutions

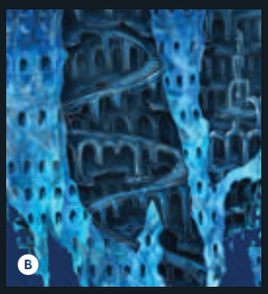
The composition of this concept sets the ground on one level, which means we have far fewer elements to build the 3D impression with than in a regular architectural scene. We need to find other elements to build our atmosphere and to give off the solid impression that a 3D render should provide. If not, the render will be just a normal, flat picture. I decide to focus on the shader, lighting with volumetric effects as well as adding a couple of elements in the foreground to better describe the distance between the viewer and the ice structure. Modelling ice isn't that simple in 3ds Max, either. We don't have precise sculpting tools and the vertex-by-vertex poly-modelling method would take forever. A reasonable way is to adjust some modifiers to speed up the process, while keeping interesting results and getting close to the concept. Procedural maps and displacements will enhance the model.

Plan your project

Begin to work from the concept piece

01 Prepare the scene The initial stages of this project are crucial, so we need to divide the concept into parts to simplify the workflow. I decide to focus on the main shape of the iceberg, the interior arcades and the spiral staircase. Making a plan and a list of elements will help you to get the job done and not fall into limbo. Start with simple shapes such as a couple of polygons, to try to fit the scale and shape to the iceberg concept A.

02 Find the best scale Analyse the concept and look at the single elements. Our main elements are the iceberg, interior arcades and spiral staircase. To achieve the best results when rendering, we need to properly scale the scene to get a physically correct response from the rendering engine. It's not easy to judge scale when working with an abstract concept like this, although the arcades can give us an idea of what scale we should use. For instance, assume that one level of arcades will have a height of four metres B.



A Start with simple geometry to get the right scale following the concept art

B Look at elements you are familiar with from reality to find the right scale

C Consider the composition to better understand the merits of your view

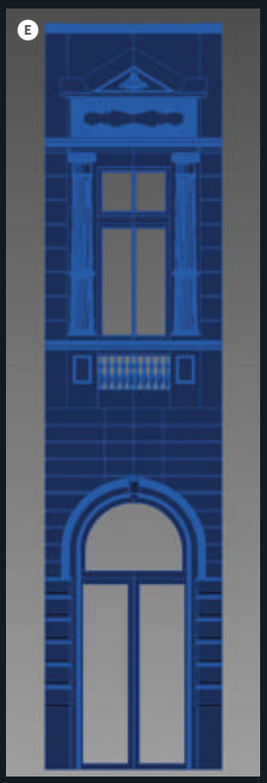
03 Set your camera Setting the camera up at an early stage will help you find out how much will actually be seen. Later on we can adjust the level of detail to the view. The concept shows the iceberg from a frontal view, which is a nice angle that exposes lots of details. Unfortunately, for a 3D scene it won't be easy to get a great 3D depth because we can't divide the scene into grounds (foreground, midground, background). This means that all the elements will appear equally important in the shot and the lighting will have a minor impact on the space-perception C.

Begin modelling

With the planning done, we can now build the main elements of our scene

04 Carve out the ice Once we have defined the correct scale, it's time to develop the main structure. I build simple geometry to keep the dimensions of the concept and on the top of the model I add a MeshSmooth modifier plus a Displace modifier. For the Displacement map I use a Noise Procedural map. Creating distortion will break the light rays nicely and provide the ice effect later on. To add extra detail I use the Push/Pull tool from the Editable Poly panel. Using a graphics tablet is very handy at this stage, as this part is very similar to a simple sculpting process. Now it's time to focus on the edges and the exposed top element (D).

05 Add the arcades The other important elements to focus on are the arcades. We have plenty of them visible in the concept sketch, so I start by modelling one module in high detail. After a rough calculation, the scene's total poly count will be at around 100 million, so to combat this I use VRayProxies to spread the modules, or optimise them. I find optimised geometry better because there's more control in the final model and the opportunity to adjust every single element, if needed (E).



(D) Use modifiers to add details in a procedural way. This will make the process fast and far more efficient

(E) Create a single model of an arcade to scatter inside the iceberg structure

(F) Create Normal Bumps to save memory and speed up the rendering time

Use VRayProxies

Scenes with plenty of elements usually mean trouble. Using more RAM means longer save times. Also problems with the viewport will often result and cause you issues. There are solutions that will let you avoid all this trouble, though, if the scene is suitable.

In cases where we deal with lots of elements that are copied and scattered all over the scene, like trees or the same type of detailed windows, we can use VRayProxies. A proxy – in its simplest term – is a preview of a mesh that is saved outside the current file. What's important is that the mesh, while rendering, will be loaded only once – even if in the viewport you have billions of proxies. The only disadvantage is that the preview of the VRayProxy is not as accurate as regular geometry, so to change the proxy you need to edit the source geometry first and export the mesh as a proxy again. From the other side, when you wish to change all the elements at once, all you need to do is load a different mesh and it's done!

VRayProxies have given artists a lot of freedom. Since these options were added, the creation of grass, pebbles, whole forests and more has become much easier, enabling artists to strive for far better results.

06 Mapping & Normal Bumps Once the arcade model is complete, I unwrap it and render the Normal Bump map. You can do this very simply by rendering the object without GI and saving the V-Ray Normals render element. I then simplify the model using the Optimize modifier and rebuild some elements, like the pillars and windows, into much simpler geometry. I apply a shader to the low-poly model with the rendered Normal map as a bitmap under the V-Ray Normal Bump. Thanks to this action I can save millions of polygons, while keeping a decent level of detail at the same time. Also, I find rendering times are much improved. So, with the concept angle, distance from the camera and a planned resolution, I am sure this level of detail will be good enough (F).

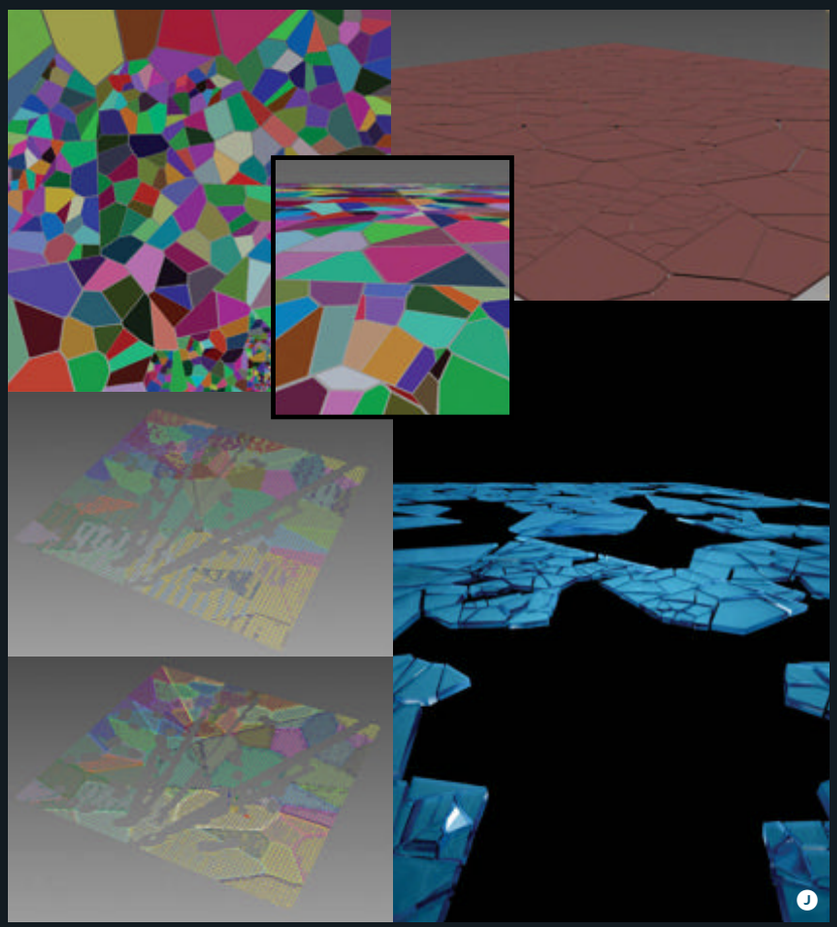
07 Scatter the arcades It's now time to multiply the modules of arcades along the iceberg. Set the pivot point somewhere in the centre of the iceberg and use the Array tool to instance the arcades with 360-degree rotation. Please remember that instanced elements will not increase the file size, which will speed up the saving process. I repeat this step a couple of times, changing the pivot point for each level to fit to the iceberg shape. To finish, in places where the ice element is open, simply delete the surplus modules G.

08 The spiral staircase The concept shows there is a communication system between levels with spiral stairs. Keeping in mind we have an abstract visual, I decide to use a stock stair element from the Create menu, not paying much attention to the correct scale or even whether the stairs will reach each floor. Once I have the general shape of the stairs ready (I choose a closed type of stairs), I apply the FFD 2x modifier. Selecting the control point on the bottom, I scale them down with the Scale tool to taper the entire shape and adjust the radius to the iceberg's dimensions H.

Fracture & demolition

When working with architectural visualisation, in most cases we don't need much destruction in our scenes. Most likely our clients will require a clean environment, but there are situations where some damage can be expected. 3ds Max is a very powerful tool for this and in recent versions we've been given the MassFX simulation system, which enables a very quick and easy way to collide rigid bodies. RayFire and FumeFX give advanced smoke and fracture effects, although for most arch-vis stills, simple scripts will also do the job. Today, workstations are very powerful, but it's crucial to keep scenes optimised. It's very easy to go too far with details and for the geometry to lose focus on the atmosphere. The battle between light and shadow is what makes images truly unique.

09 Give your structure space At the very beginning of this project I knew the shot wouldn't be easy to sell in a 3D environment, because the composition would make it far too flat. The concept looks really exciting as a 2D painting, but it's now my job to also make it vivid and alive in the third dimension. I agree with Sonia that some foreground elements will let the viewer better judge the distance and perceive the depth of the final image. The iceberg is floating in a vast ocean, so it's interesting to add some broken ice floating around. This gives the viewer information about the camera angle and perspective, giving the structure the chance it needs to really show off its 3D depth I.



G Use Array to multiply the arcade modules

H Use a stock stair element in 3ds Max to add the communication system, as seen in the concept

I Create extra ground elements to gain better spatial performance

J Apply some fractures to the ice using MaxScripts

10 Fracture the ground Creating fractured elements is usually a challenge. I could complete this task manually, but again time is always precious so I decide to dig out some handy scripts. This time I'll use a script called Fracture Voronoi (**www.scriptspot.com/3ds-max/scripts/fracture-voronoi**), which can be found and downloaded for free from ScriptSpot. The first step is to create a plane object, then set the dimensions to fit the camera angle and canvas size. Set a reasonable segment count for the plane and run the script. First copy the code from the ScriptSpot site, open the MaxScript window, paste the code, save the script on your drive, then hit the Run Script button and choose the previously saved file. A pop-up window will appear with your script options, so set the element count to divide the selected object into as many pieces as you wish J.

Bring in light & shade

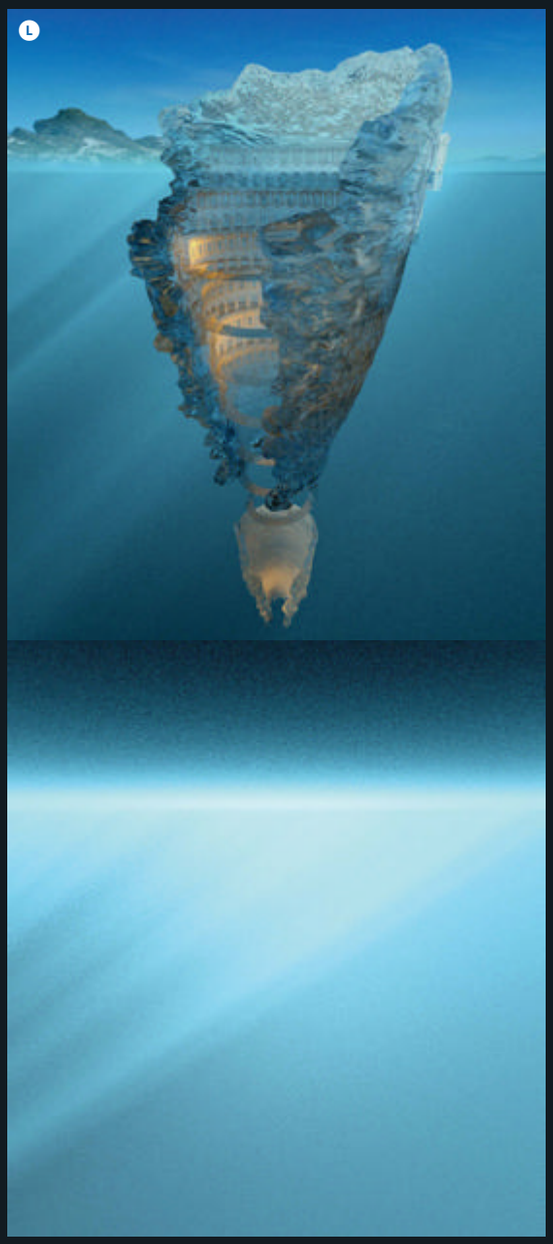
Focus on the shaders, lighting & atmospheric effects

11 Use ice shaders The ice shader is key to this scene, as it will obviously get applied to all the elements. I prepare two types of shaders: one for the general iceberg shape and the second for the arcades. The arcade shader will be exactly the same as any other, except for an added Normal Bump created at the very beginning to add extra detail, as well as to keep the poly count low. The ice shader has 100% Reflection, with Reflection Glossiness set at level 0.9 with Fresnel effect and IOR changed to 12. Refraction is totally transparent. Additionally, I add a foggy blue colour and turn on Translucency mode for the soft water K.

12 Apply some environment lights Lighting is not an easy step in a piece like this. The glassy ice shader needs to reflect the environment in order to highlight the shape details. Photography rules have solutions for such scene types and recommend a black or white environment with proper black or white side reflections. I decide to go a little further and engage the VRayEnvironmentFog for volumetric-lighting ray effects. The main light source for direct rays is a VRaySun. A high amount of environmental fog is set to 100m, which produces a sort of vacuum environment broken by the light rays L.

Motion in still images

Still images have obvious limitations: we can only view the scene from a certain perspective and we have no power to look around the details. The key is to bring life to the image, so the viewer remains attracted to the focal points that the artist intended to expose. This means less work can be applied in the artwork, but the impression will be the opposite. Motion in images with walking characters and moving vehicles can bring a lot of information about world structure, physics, time and can also provide information out of context. Taking our iceberg as an example, the extra flying pieces of ice make us feel we are dealing with vertical movement. It's just a captured moment, but also provides clues about what could happen in the next second. This is all about telling a story and the quality of the image or the techniques may play a secondary role, if the shot is planned well.

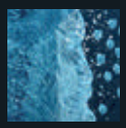


13 Particle effects To represent broken ice flying around the scene I'll create a blizzard system. Set the Particle Type to Triangle and adjust the Speed to Camera Shutter. If the speed is too high, the particles will be blurry. The broken ice surface needs some debris pieces, so using MultiScatter I spread three types of crystals regularly across the whole surface M.

K Create an ice shader with a fog effect to better achieve the depth of the elements

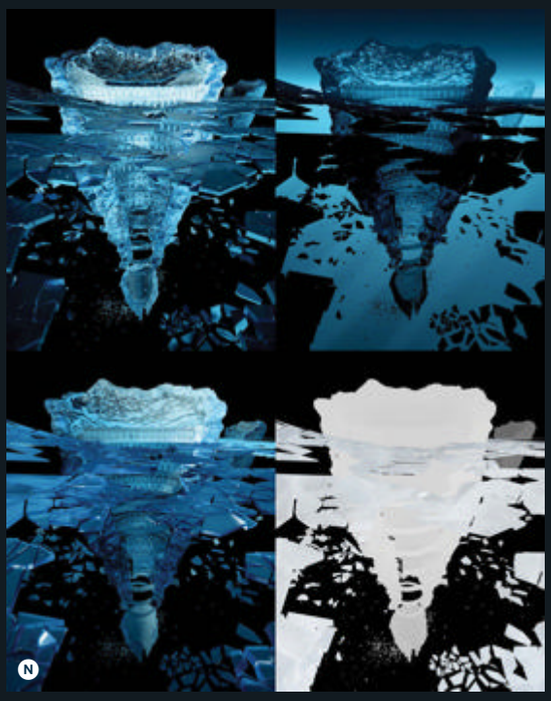
L Create light rays with V-Ray's environment fog

M Use particle systems for creating dynamic detail



Post-production & compositing

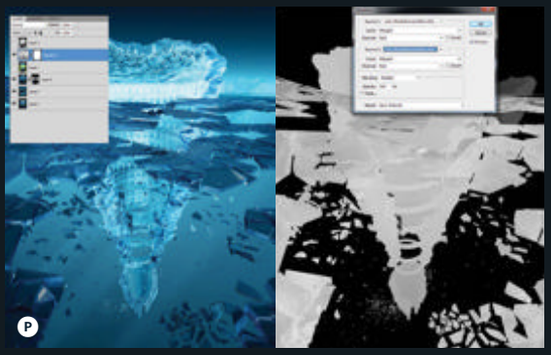
Move into the rendering & post stages to finalise your scene



14 Choose your renderer I'm going to use V-Ray as the rendering engine. Balancing the time-and-quality ratio, I choose the Light Cache and Irradiance map as the GI algorithm. I need to remember that in post-production I'll add a couple of main render elements, like RawRefraction, RawReflection and WireColor. At this stage I know the RGB pass will not be the main one used while compositing. The environment fog can also be saved with an Atmospheric pass. Combining all the elements on a different layer brings me to the final result. Please be sure to increase the subdivisions for the fog; in this case 24 works well N.

15 Post-production sketches Usually, rendering tests are enough to give you an idea of where you're heading with a final image. Because in this case only the combined passes are present before the final output, I render a sketch shot during the process to see if all the pieces will work together. The presented post-production set enables me to decide which colour scheme I should go with for the final production. Perhaps this is duplicating the work, but either way it gives me more control over the concept O.

16 Prepare the PSD file After creating the post-production sketches and final rendered passes, I start to organise the layers. On the very bottom lands the RawReflection pass, which becomes my base. Above, I add a masked-out Atmosphere pass, placing the rays and light around the iceberg and setting this to Screen mode. Using WireColor on the very top for a quick selection will help, but keep this invisible for the final save. Use Calculations and the ReflectionFilter pass for creating the mask, which can be used to control the Transparency and Reflection levels of the ice, combined with the RawRefraction pass P.



17 Build the water & add some effects Water bubbles are painted using a round brush with Dynamics and Scatter options enabled in Photoshop. Again, using a tablet gives you lots of freedom and better control while painting. Try to create black layers on the very top of the stack. Paint blue circles with a large, soft, round brush and set the mode to Soft Light or Screen. This is how you can create glowing bowl effects, which will add more atmosphere to your image Q.

Find the right lighting

Build atmosphere with good lighting effects is very important. You can achieve them in your rendering software, like the volumetric light rays created in this tutorial, or you can apply similar effects in some scenes using Photoshop plug-ins. I recommend the Rays plug-in by Digital Film Tools (www.digitalfilmtools.com/rays). Remember: well-balanced images are friendlier on the eye, while too many colours in your scenes may be distracting. In my workflow I try to find a leading colour for the shot. So on the top of the layer stack I place a Color Balance adjustment layer to make the colour range a little more even.

N Try to save different render passes for the post-production process

O Test different post-production options to decide on the best workflow

P Organise the render elements in one PSD file

Q Paint bubble effects with Scattering brush options

> The vegetation in the project is entirely CG, from the plants and bushes that surround the building to the trees in the background. To make the scene suitable for lighting and rendering we made [the plants] as proxy objects, scattered all around

Complex in Arsuf 2012

A terraced complex in the centre of Israel overlooking the Mediterranean, consisting of ten luxury apartments, each with its own unique design. Our job was to create the exterior visualisation of the complex, including the 3D surroundings.

> Our main task was to create the environment and make it similar to the real area where the building would be located. Photographs taken from the location [were used] as references to... implement in the CG scene

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Studio Aiko

Website www.studio-aiko.com
Country Israel
Software used 3ds Max, V-Ray, Photoshop
Bio Founded in 2005, Studio Aiko handles many CG projects, from arch vis to product simulation

Software used in this piece

3ds Max | V-Ray | Photoshop

"For the ground we used several photographs taken from the real location where the building would be located. We then composed them together and produced a Displacement map in order to achieve a realistic look with all the small details"

behind the scenes

3D artists explain the techniques behind their amazing artwork

Artist info

Juraj Talcik & Veronika Demovicova

Personal portfolio site www.jurajtalcik.com

Location Bratislava, Slovakia

Software used 3ds Max, Marvelous Designer, ZBrush

Expertise This duo specialises in high-end interior visualisation and dabbles with all kinds of other 3D projects

3D cloth effects

Modern interior 2013

"When you want to create beautiful arch-vis interiors filled with custom-made furniture and materials, Marvelous Designer can help with a few tricks"

Juraj Talcik and **Veronika Demovicova** are creative partners with architectural backgrounds

ON THE DISC

Exclusive **Marvelous Designer 2** trial*

*Your exclusive free trial allows you to learn the tools and tricks of Marvelous Designer without any time restrictions. However, please note that this exclusive, never-ending trial for 3D Artist readers does have export/save limitations. For a limited trial with export/save functionality, you can download from www.marvelousdesigner.com.

With the Disc

Tutorial files:
- Tutorial screenshots

Software used in this piece

3ds Max | Marvelous Designer | ZBrush

Learn how to

- ☑ Create your own bespoke cloth assets
- ☑ Optimise meshes

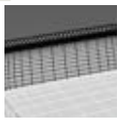
Concept

The goal in this tutorial is to create a high-quality bed with a voluminous duvet filled with wrinkles and details. We want to avoid the age-old look of a blanket thrown over the top, which you so often see in arch-vis scenes.

It's been few a months since we won a licence for Marvelous Designer in a competition held by CLO Virtual Fashion. It's now integrated into our everyday workflow.

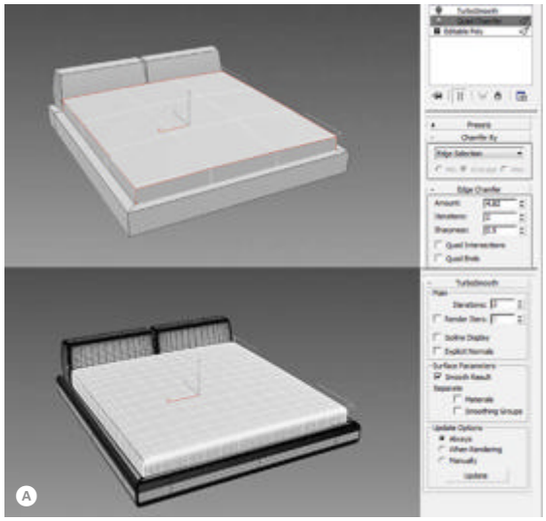
We now use it inside almost every commercial project that comes along, creating custom and unique models from reference furniture that we enjoy – such as contemporary brands like Poliform, which was a reference for the bed model used in this scene.

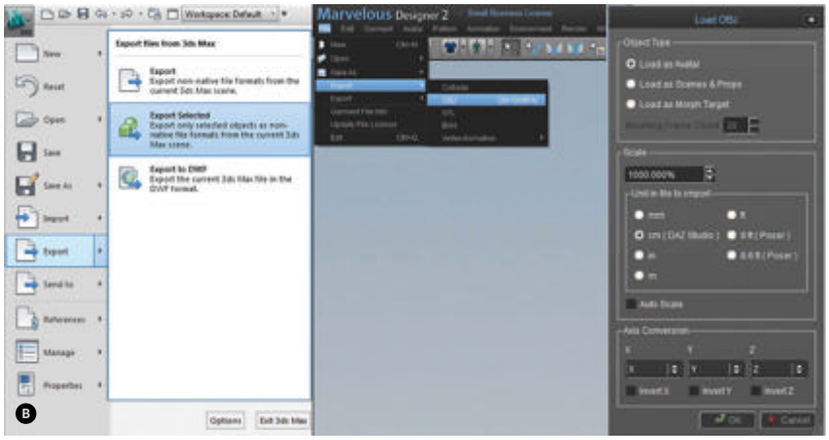
This tutorial will teach you how to create a single asset from scratch, showing you each step necessary to complete the task. You'll be taken all the way through to the final optimised mesh, which will be ready to add to an arch-vis project.



Create a simple bed

Begin by modelling the bed before taking it into Marvelous Designer





01 Make an initial Avatar We'll start the process by adding the first Avatar – which is what the base mesh used for simulation is known as in Marvelous Designer terminology. It's very important to model using real-world units, because the simulation is physically based on the real-world properties of fabrics. We'll model our bed according to the size of a Poliform bed, which will be our reference for this tutorial. However, you can use any bed reference you prefer. In this case we'll be box modelling with the Edit Poly tools in 3ds Max. We also use the Quad Chamfer modifier plug-in from Marius Silaghi (€40 EUR from **www.mariussilaghi.com/products/quad-chamfer-modifier**). Though this plug-in will help us during this part of the process, it's not strictly necessary. It's important to have a mesh with a few smooth iterations, to avoid visible faceting on the simulated cloth from the underlying base mesh. Marvelous Designer handles detailed Avatars well, so it's better to go higher than regret it after the simulation is done and artefacts have appeared Ⓐ.

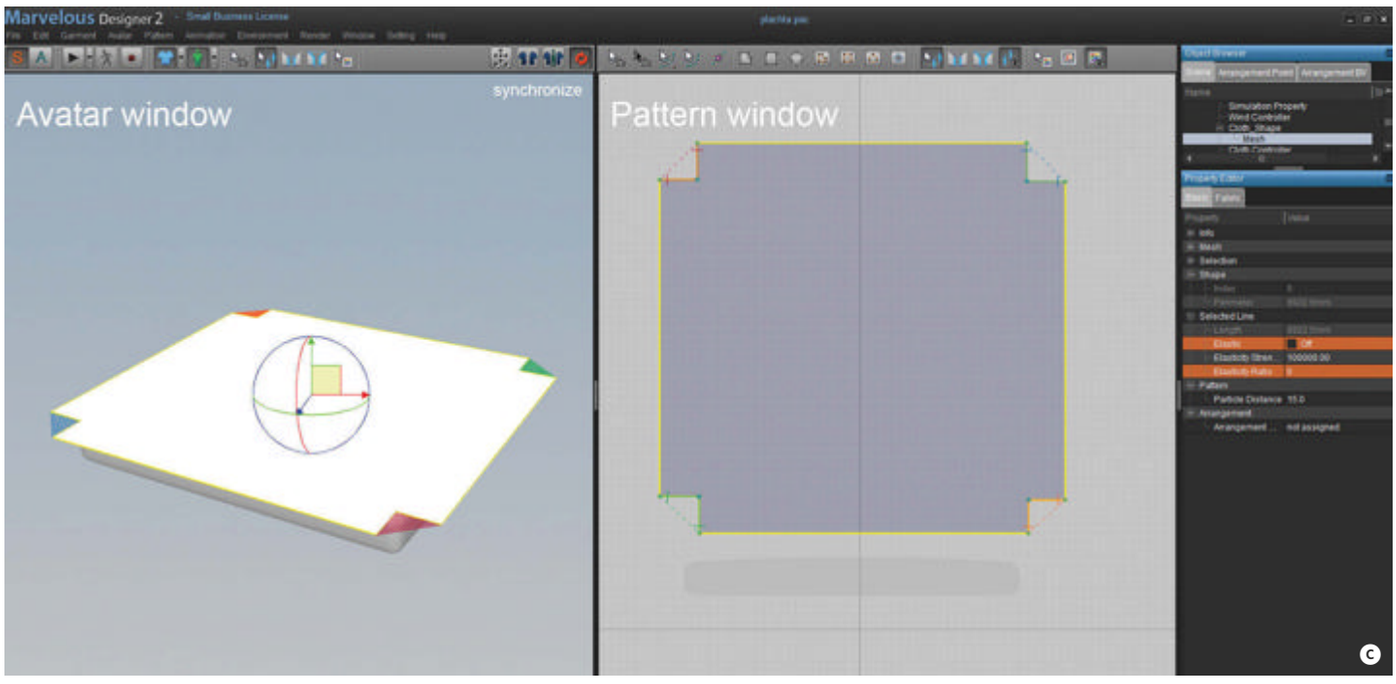
02 Import into Marvelous Designer Once we've finished modelling the necessary parts of the bed's structure, we can export them into Marvelous Designer. This will be done step by step for each modelled part, in any order you prefer. Select each part individually and save it in an OBJ format with a respective name – such as 'bedframe.obj', 'mattress.obj', 'BackPart.obj' and so on. This will help keep things organised. Also, keep in mind that we're using centimetres for modelling, exporting and importing alike, so no unwanted scaling should occur Ⓑ.

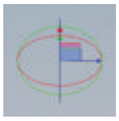
03 Create the first pattern We'll begin with the easiest part: the mattress cover. Rather than creating a simple square-cut cover, we'll opt for an inset square that will generate nice folds at the vertical corners of the mattress. After drawing the pattern with the Line tool, select the neighbouring edges at the corners and sew them together using the Segment Sewing tool. Synchronise the pattern into the Avatar window and position it over the Avatar, with the white face of the cloth facing away from it. This will keep proper normals, which are very important. Setting the Particle Distance to 15 will keep preview simulations fast Ⓒ.

Ⓐ The selection of outer edges to be chamfered before applying the Smooth modifier

Ⓑ Export from 3ds Max into Marvelous Designer

Ⓒ The Avatar window next to the Pattern window with the table showing Particle Distance

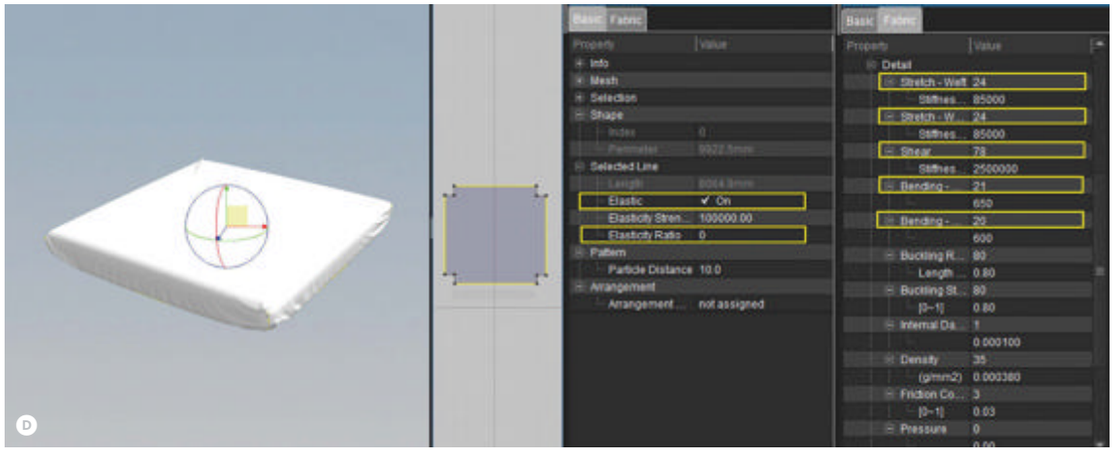


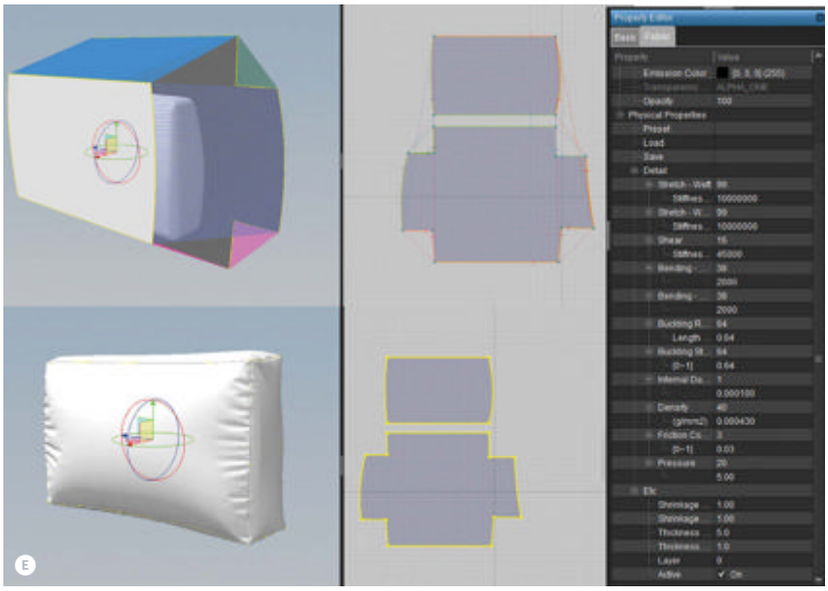


Get ready to simulate

Master cushioned effects with Marvelous Designer

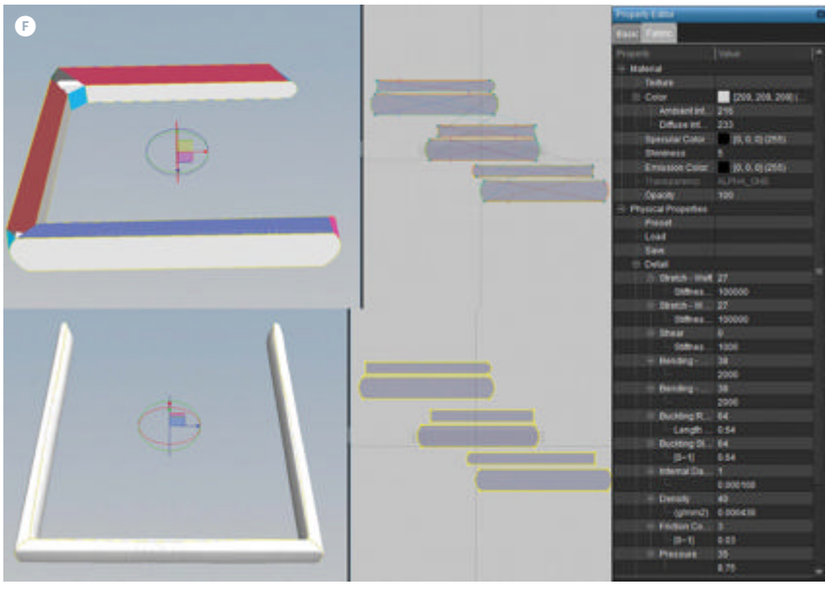
04 Shape a cover The simulation will be done in multiple steps to help us achieve the exact look we're after. First, let the pattern simply fall on the mattress. After it settles, pause the simulation, select four outer edges that aren't sewn and give them elasticity to tightly wrap the mattress. Lower the Bending value for a softer look and raise the Shear value to create smaller wrinkles. For the final simulation, change the Particle Distance to a lower value and let it compute for a while, until it settles Ⓓ.

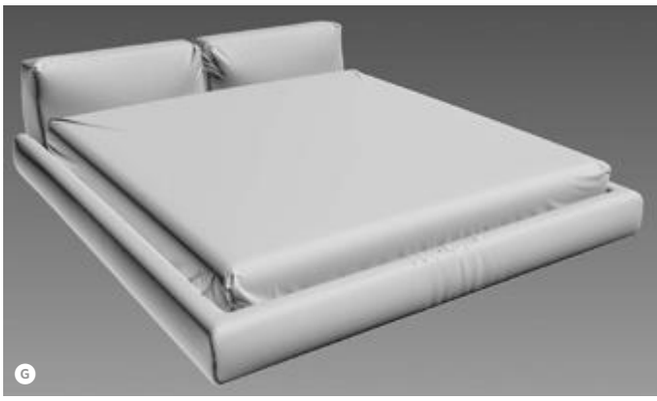




05 Replicate cushion effects The back elements of the bed frame are sewn together from two pieces of leather. Pay attention to the sewing order so that after synchronisation all the lines between the cloth pieces remain parallel. Notice the edges of our pattern are curves, rather than straight lines, in order to naturally follow the shape of the underlying Avatar. You can start adjusting your cloth values from the Leather preset Ⓔ.

06 Master a bed frame Using the same process as before, this time we'll work with multiple pattern pieces. The left and right pieces are identical, but the middle piece is only scaled. Synchronise and position the pattern pieces around the Avatar, making sure the sewn lines are parallel. The same leather material is used for the bed frame. Simulate the Particle Distance value at 15 first, pause the simulation, then change to a lower value (3) for the final simulation Ⓕ.





Ⓓ This table shows the exact values we're using for our fabric cover simulation

Ⓔ The upper-left window shows how to position patterns after synchronisation, before you hit the Simulation button. The table shows the values used for the leather material

Ⓕ Observe the position of the patterns around the Avatar

Ⓖ The assembled mesh from simulated parts, shown inside 3ds Max

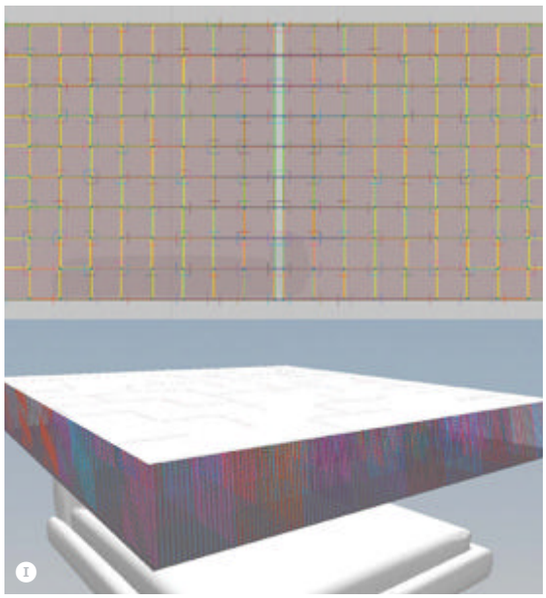
07 Make your second Avatar Your finished, quality simulation will run forever by default, so you'll need to pause it once it looks settled and acceptable. Remember, you're looking to achieve the greatest realism possible. Now you're ready to export the mesh back into your 3D application. However, make sure you export only the simulated cloth, not the original Avatar Ⓖ.

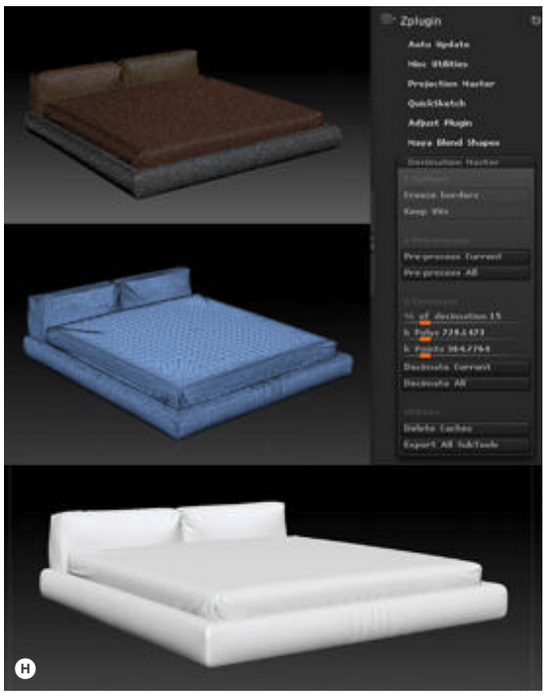
Optimise & simulate

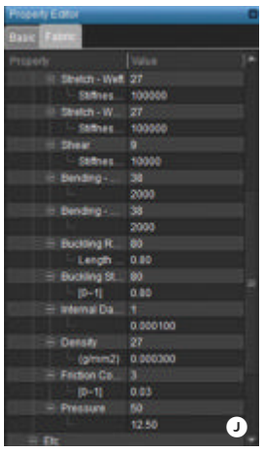
Using the new Avatar we can proceed with new cloth simulations

08 Enhance your mesh At this stage we're going to re-evaluate our newly assembled mesh at two levels for two different purposes: the final mesh and a new Avatar for upcoming simulations. Here we're using the ZBrush plug-in Decimation Master, but if you don't have ZBrush there are other tools available, such as the native 3ds Max ProOptimizer Modifier. Make sure you check the Keep UVs option, as these have been generated by Marvelous Designer so you don't want them to be lost in the process. First, decimate to 15% and save this as your final mesh of the bed frame, then decimate to a super-low 1%, which can be used as the new optimised Avatar. Even applying such a low decimation will preserve a surprisingly high level of detail and keep the simulations running fast H.

09 Make the inner layer The bed cover is made of two primary layers: inner inflated, which is responsible for the voluminous effect; and a segmented-looking outer, which will create the wrinkles. Again, these details are essential for getting the realism we're after. At this stage we'll also create the inner layer by drawing a square pattern, duplicating it 162 times and sewing all the neighbouring edges. This is an easy but tedious process that requires a lot of patience I.







10 Add in some essential physics Pressure is a new feature shipping with Marvelous Designer and is a little tricky to use, compared to what you might be expecting. This option behaves a bit like helium and doesn't keep its form, so you have to force it to take the desired shape using various tricks. Remember: always start with low values so your mesh doesn't fly away. You can add Pressure to all of the inner-pattern pieces, but getting the correct values will require close attention J.

H Shots before and after the decimation. The compression can be visually lossless

I Notice the parallel lines of the sewn edges and take care to avoid mistakes in the flow of their connections

J A table chart showing the exact values for the inner cloth

Produce UVWs from Marvelous Designer

One of the brilliant aspects of Marvelous Designer is that it automatically generates nice UVW sets, so there's never any need to unwrap the meshes manually. This is fortunate, as it would be impossible at their size. The program creates UVWs of a corresponding size to the pattern, so for example if you create 2 x 2m square pattern you will get a respective UVW of the exact same size. You can also choose the Unified UVWs option in case you want all the patterns in the Pattern window to share the same scale of the UVW set. This is a very helpful feature if you plan to apply the same material to all the patterns in the Pattern window, otherwise you'll end up with a different scale in the blanket and pillows, for instance.

Artist Showcase

Juraj Talcik & Veronika Demovicova

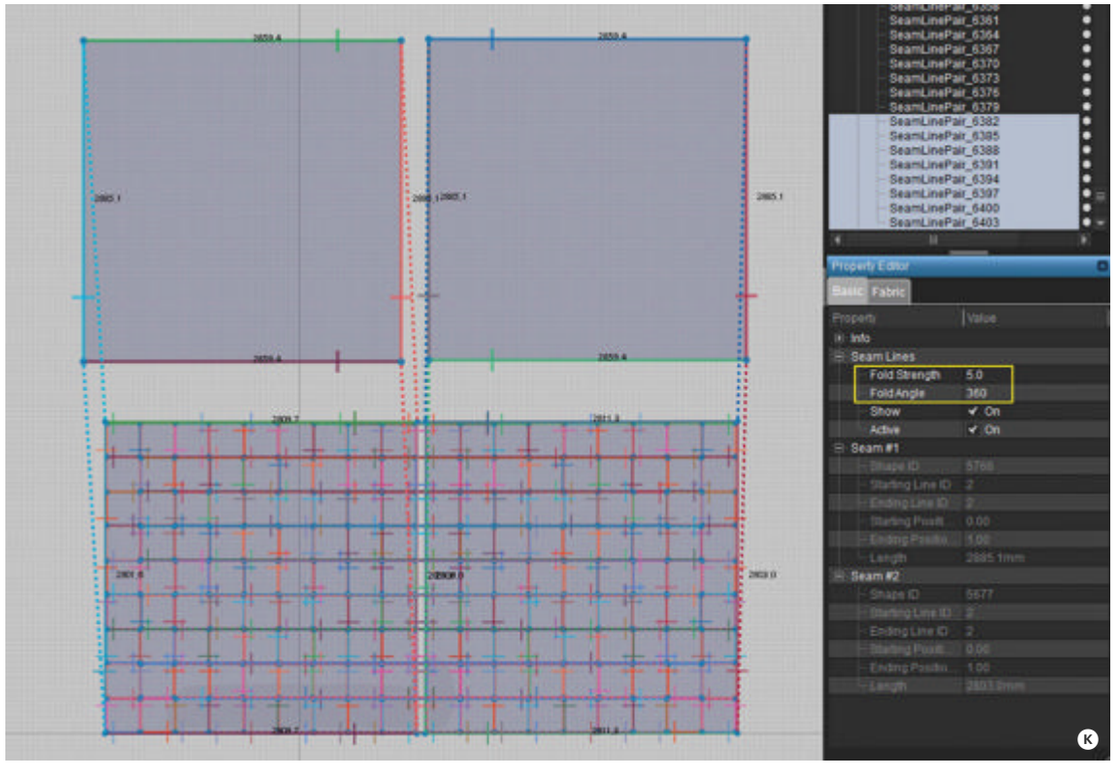
Juraj Talcik is big fan of architecture, contemporary design, technology and videogame development. Veronika Demovicova shares a love for all kinds of design and is currently on her way to finishing an architectural degree.

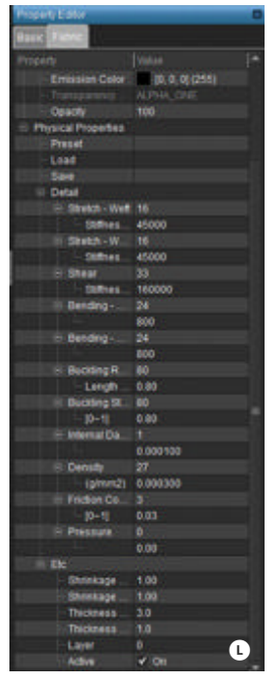
White interior **3ds Max, V-Ray, Marvelous Designer, Photoshop (2012)**
An architectural visualisation by Demovicova for a modern apartment renovation project

Forest Cabin **3ds Max, V-Ray, Photoshop (2011)**
This was Talcik's first exterior project and he still thinks of it fondly, even though he feels it shows its age and lower skill level at the time

Simulate & adjust

Achieve realistic results to complete your design





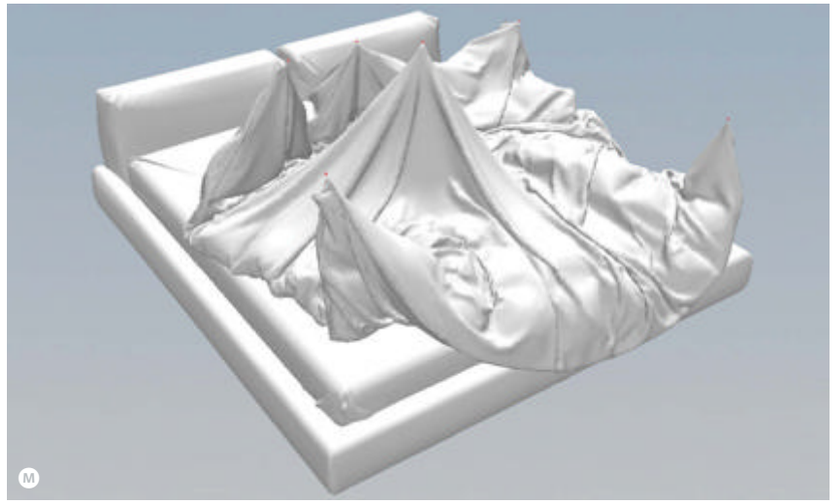
K On the left we have the sewing flow. The table on the right shows Seam Line values for the selected outer edges

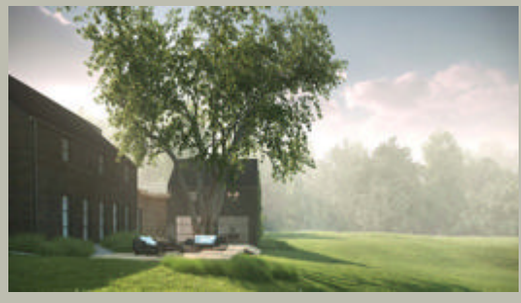
L The exact values used for our bed cover's outer layer

M The red dots represent pins on the bed cover

11 Set the outer layer of the bed cover First, create two rectangles, each of a slightly larger size than the underlying grid of the cover's inner layer. We won't sew these together, but rather to the outer edges of the grid instead. Next, adjust the selected edges in the Seam Line properties and set the Fold Angle to a value of 360. This should create a nice seam along the sides of the bed cover K.

12 Set your cloth values The important values here are Stretch, Bend and Shear. You'll notice that all of these options can be set using two axes: along the width and length. Unless you have a very specific design reason to set them asymmetrically, just use the same value in both axes. We'll keep the mentioned values low to provide the wrinkly, used look we're aiming to achieve L.





Country house **3ds Max, V-Ray, Photoshop (2012)**
This project features the duo's ongoing effort to successfully create custom 3D foliage, in this case grass and trees. Using bespoke models never fails to add a unique feel to a piece!

Fabric materials

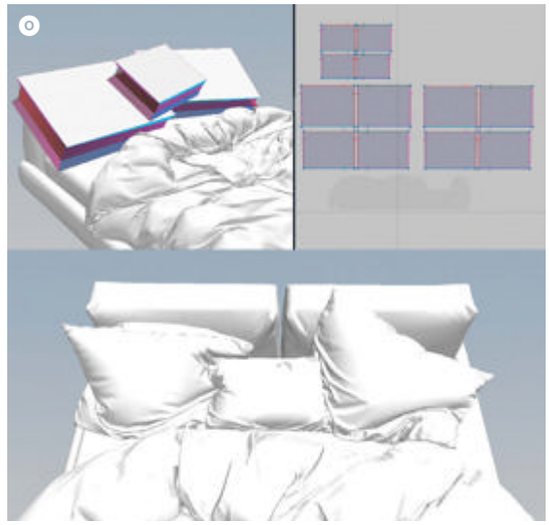
Though the internet is full of various ready-to-use, tiled textures these days, resources of quality fabric textures are still scarce. However, a new trend has recently emerged for modern companies to provide samples of their products in digital form. The Republic of Fritz Hansen (**www.fritzhansen.com**) lets you download quality 3D models set up with materials; Poliform (**www.poliformuk.com**) gives you low-quality AutoCAD models; and German fabric producer JAB (**www.jab-uk.co.uk**) has uploaded a huge library of extremely high-res textures to its website. There isn't a better source for amazing textures than this!

13 Simulate the bed cover element
After letting the bed cover fall on the mattress Avatar, we'll pause the simulation and select parts of the bed cover using the Pin tool. Press W twice on the keyboard and click at various chosen spots, then move them around like you are dragging a bed cover and resume the simulation. Continue until you're satisfied with your resulting messy look M.

Finalise your mesh

Optimise and apply your newly made assets

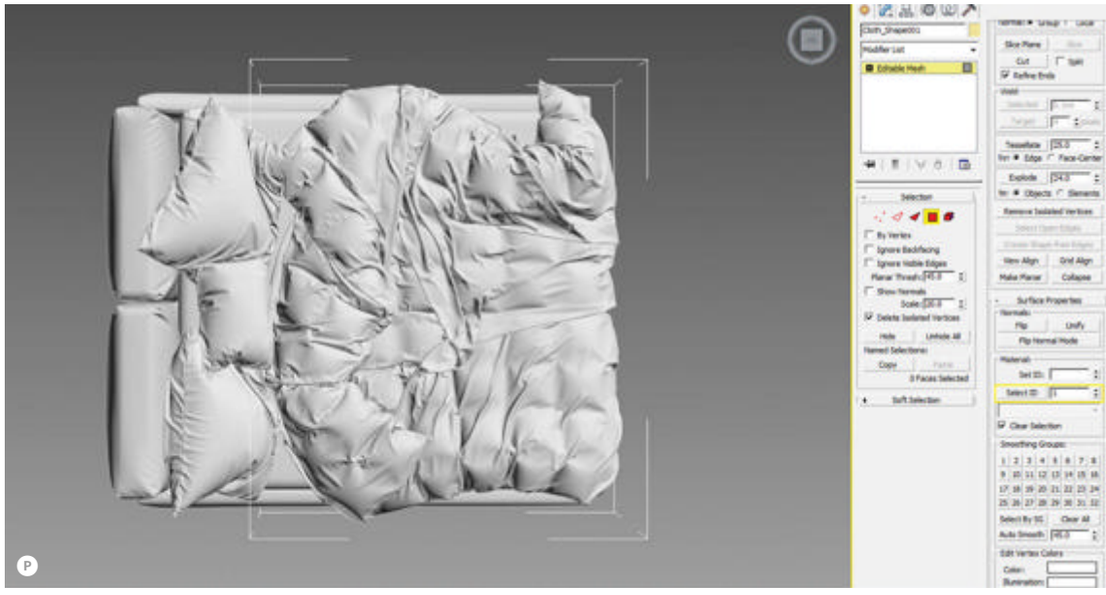
14 Boost the quality Once you're completely satisfied with the look, leave only a minimal amount of pins on the model (or, preferably, none at all). The cloth will settle to a much more natural state, while retaining the overall look. We're leaving two pins in here, just to keep those distinct corners. Set the Particle Distance as low as your computer enables you to go without crashing or freezing; we're setting it to 5. Now let the simulation run for a while N.



15 Fluff up the pillows The golden rule with Marvelous Designer is to simulate one thing at a time. Export the simulated cloth, decimate it in ZBrush, reassemble it in your host application and import it as a new Avatar. Pillows use the same values as the cover and are much easier to create. Inner Pressure is gradually lowered to create the depressed or partially deflated look O.

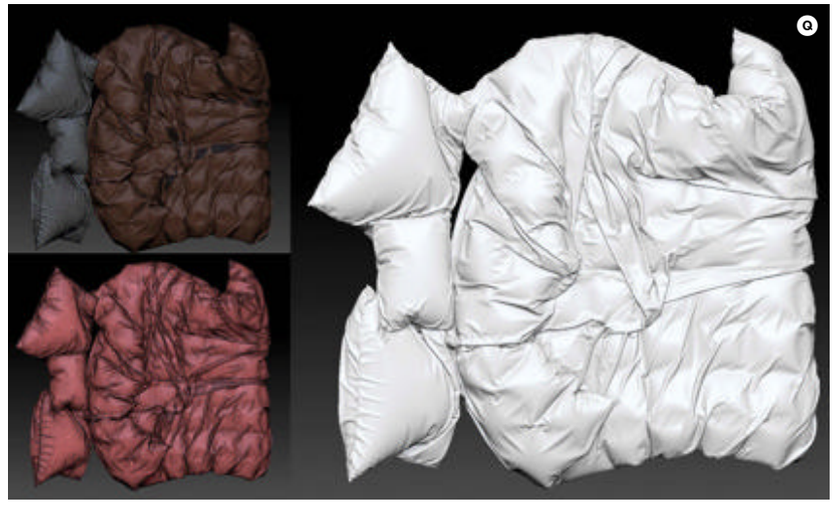
How to fill an open wardrobe

We often get asked questions about our wardrobes. It's very easy to create: simply draw some basic rags on the doll Avatar. This is a very intuitive process. Then just swap the doll for a clothes hanger and use pins to keep it hanging there. You can even find some ready-to-use cool clothes in the free Marvelous Designer repository. In a few hours you can have a full wardrobe with a unique look and high reusability!



16 Complete the assembly We can now merge all the exported cloth parts from Marvelous Designer back into our 3D application. They should fit together straight away, so we can delete the internal (pressurised) parts of the pillows and bed cover, since it won't be visible anyway and will save a huge number of polygons. If you apply various colours to the patterns in Marvelous Designer, it will generate different IDs for them and you'll be able to easily select and delete them P.

17 Final decimation Now all we want to do is adjust the pillows and bed cover. Using Decimation Master in ZBrush is a good way to do this. We find 15% a great value for visually retaining detail while making the mesh substantially lower Q.



N Our ongoing simulation. Since it will run forever by default, stop it once you like the result

O Pillows can get away with having very simple, square patterns, as shown here

P Use the Editable Mesh Select ID tool to pick inner faces in one click and delete them

Q Before and after decimation in ZBrush. The white-shaded view confirms there are no artefacts

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: www.3dartistonline.com/news/tutorial-files

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3DArtist Back to basics

Kicking up a storm: Jahirul Amin guides you through a challenging animation – the tornado kick!

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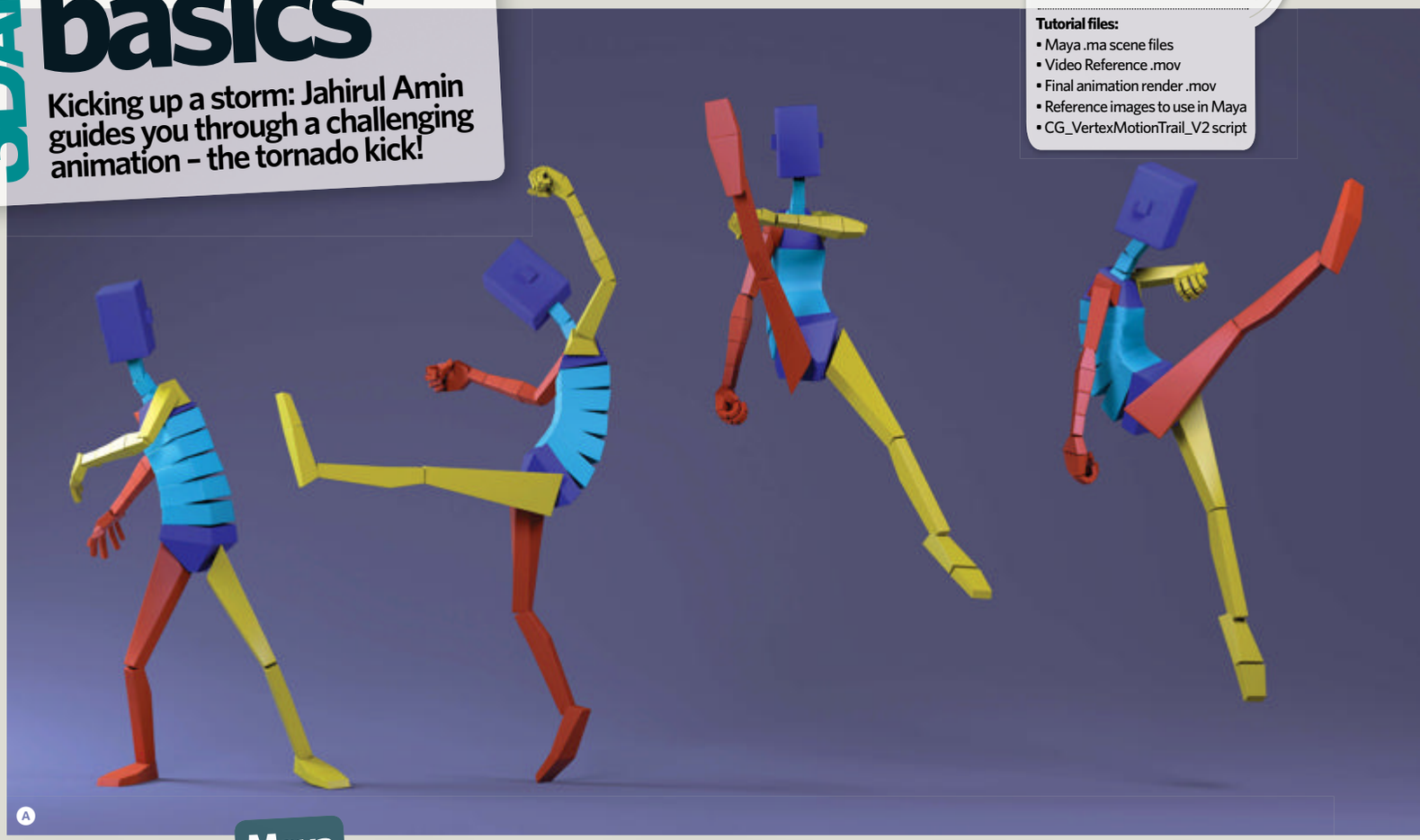
Tutorial files:
- Maya .ma scene files
- Video Reference .mov
- Final animation render .mov
- Reference images to use in Maya
- CG_VertexMotionTrail_V2 script



A

Maya

Animate action moves

"Hong Kong GUI: we've bounced, walked, lifted and jumped, so let's put it all together in a 540-degree martial-arts kick!"

Wrapping up our lessons on animation (see issues 47, 48, 49 and 50 for other helpful guides, including walk cycles and weight-lifting), we should now feel brave enough to experience the creation of an action move: the tornado kick.

This 540-degree move, practised in Taekwondo and other martial arts, sees the body at its finest. It is, without doubt, a very challenging piece to animate, but it brings together the work that we have already done to a pretty impressive crescendo. There's so much here: timing, spacing, anticipation, weight, path of action, arcs – you name it! The poses are very dynamic and there are opposing tilts between hips and shoulders, as well as twists in the spine. We will be using the principles of the bouncing ball, which we saw in issue 47, so our timing for this piece can be established using the ball as the hips of this character. However, the obvious addition of limbs – not to mention the spin – will give us plenty to get our teeth into.

As ever, the initial work must be devoted to reference. There is an abundance of excellent reference online, so when you find some examples that you like, make sure you analyse them over and over. It's a very complex move and you'll need to focus carefully on weight-shift, the spacing of the feet as they move through the air, as well as the natural arcs and flow. Listen to martial-arts trainers online talking about the move: how weight shifts and which parts of the body lead and which follow. I guess you'll always be against the clock when animating, but it's always worthwhile doing the prep, as once you've started the animation process, having to go back on yourself is even more time-consuming – not to mention dispiriting. Make use of tools such as Kinovea (www.kinovea.org) to make your life easier.

In previous lessons I've encouraged you to try the moves you're intending to animate. However, in this case it may not be such a wise idea if procreation interests you in any way. So in place of this I've provided some 2D reference that can be taken into Maya (supplied). This is essentially a series of loose drawings using a stick man, which can mainly be used to figure out your timing. When it comes to the poses, these can be pushed further to make the whole piece more dynamic and appealing. In the drawings, the key poses are in red and the breakdown poses are in green. The images also each have a frame number to help you work out where to put the initial poses – although this rough timing can very likely change.

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B

A final render including some of the key poses

B It's all in the arcs!

C A further breakdown of the key poses in the final animation

D Pre-planning your animation can save all the guesswork later on in the process

Because there's so much going on in this piece, it becomes imperative that we decide which kinematic mode the limbs will be in, before starting. You should find arms fairly straightforward to animate. The hands do not make contact with anything, but only follow the motion of the rest of the body, so forward kinematics will enable us to use the naturally occurring arcs. Your decision about the legs is harder, however. Your first and last poses have the feet in contact with the floor, which would suggest IK, while the fact that the legs often follow the hips suggests FK. If we opt for IK, we'll have to add the natural arcs that are provided by the FK mode and manually move the controls to enable the legs to follow the rotation of the hips. Whereas if we use FK, we'll be obliged to counter-animate the legs, as any changes to the hips will result in sometimes undesirable changes to the legs.

A third option would be to use FK/IK blending, but if there are no features in the rig that enable us to match the positions and orientations of one mode to another, this could lead to popping. Of course, you could wing it and do it by eye, but I'm so OCD about avoiding any popping that I'd advise against this.

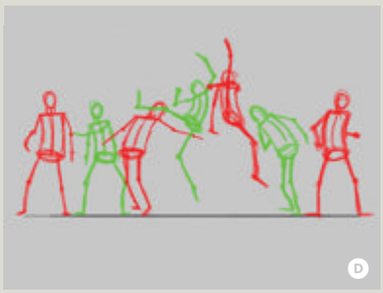
My decision is to go IK, as my major priority is to get the feet touching the floor without having to counter-animate. The price of this decision is having to force the arcs and getting the legs to follow the hips, even if it means sometimes animating the legs frame by frame. You have to weigh up your own personal pros and cons, but I think opting for IK legs results in less arduous reworking.

Now let's get the admin out the way so we can start animating. I'll be working in PAL (25fps) and as I'm animating using the pose-to-pose method to begin with, I'll set my Default Out tangents to Stepped.

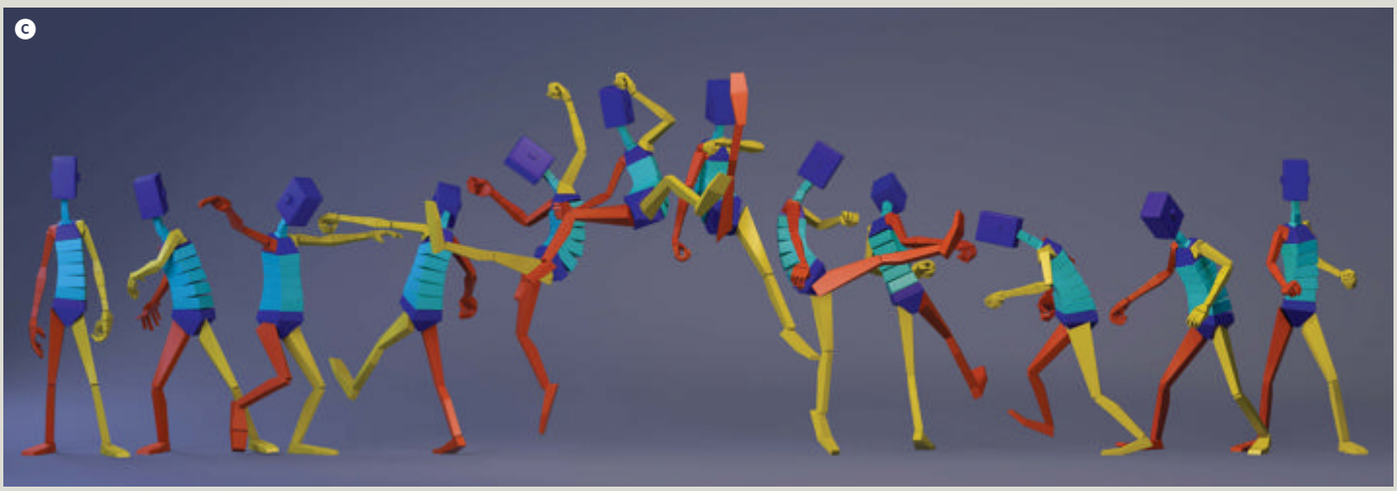
Kick off!

01 Use references

Open up '01_start.ma' (supplied) to find Box Boy in his default pose. Let's start by bringing in our reference so we can work alongside it in Maya. Go to Panels>Orthographic>New>Front to create a new camera. Call this 'referenceCam' and in the active viewport go to View>Image Plane>Import Image and select 'frame_01.jpg' from the Reference Images folder that accompanies this tutorial. Under Image Plane Attributes, edit the Display to Looking Through Camera and also check Attached to Camera. Now translate the reference camera away from the main scene and set the view as a floating window by going to Panels>Tear Off D.



D



C

3DArtist Back to basics

02 Add key poses

I'll now scroll through the timeline and put in all the key poses using the red images from the reference as a guide. I'm mainly looking to ensure I put in all the contact poses for the feet as they shuffle around, to get a better balance. I'll also want to make sure that they are following the translation and orientation of the hips as the body spins. At this early stage I want to make sure I get some interesting and strong poses happening, as well as to play with opposing lines, such as those created by the hips and shoulders and the reverse C-shape in the spine. At this stage, try to consider which body part is leading and which will be following. Later on we can think about delaying some body parts to loosen the move up E.

03 Insert breakdown poses

For the second pass through I'll start adding in a breakdown pose between each key pose. Adding these poses will enable us to better anticipate how the animation will look when we transition from Stepped tangents to either Spline or Auto. As the character is spinning and we are working with the legs in IK mode, we'll also start creating the arcs that we can then finesse later on in the process. Focus on the path of action for each limb so they flow from one frame to the other without any sudden popping. We can also begin to indicate principles such as drag on the hands and toes, as well as anticipation of the movements to come F.

04 Get the timing right

Once all the main poses are in, I'll go through and create a playblast of the animation. My main aim here is to check that the poses are clear and readable or if the action is too fast, too slow or possibly just right. I like to stand back from my monitor when doing this, as I think it reveals quite a lot that we just can't see with the screen right in front of us. In doing so, I find that in my animation I need a few extra frames on each spin, as they occur too fast and cause some popping – especially when the legs cross for the first time. To add the extra frames, I select all the controls and open up the Dope Sheet, which you can find under Window>Animation Editors. In the Dope Sheet Summary bar at the top I grab all the keys that I need to move along in order to give me the extra frames and push them to the right G.

05 Work from the core

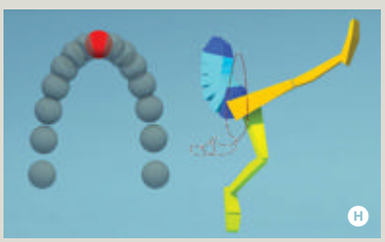
Once you are happy with the timing, select all the animation controls and convert the tangents in the Graph Editor from Stepped to Auto or Spline mode. As always, I begin from the core outwards when refining, so my first port of call will be the hips. For this move I'm mainly using the root_ctrl for translating the character up, down and rotating him, then the hip_ik_ctrl to get some extra rotation in the hips, if needed. I start by going through and deleting any keys that are not doing much for the animation or are adding too much noise. We can then go through and try to mimic the motion and arc we would expect to see on a bouncing ball. Also, you can add extra keys if you need to get the arcs flowing well in other areas, as Box Boy shifts his weight about. Remember, it's all in the hips, so getting this as refined as possible will be crucial for all the other elements H.

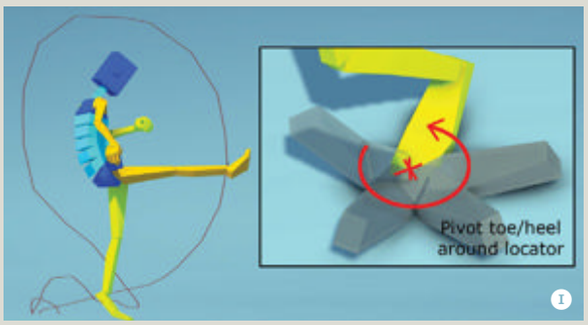
Tools & scripts

I am using the bhGhost tool, created by Brian Horgan, which can be found at **www.graphite9.com**. This is what I will use to check how one pose leads into the next through the blocking stages. To check the arcs of a selected vertex, I use 'CG_VertexMotionTrail_V2.py' (supplied), created by Constantinos Glynos. By default, Maya doesn't enable you to motion-trail a vertex, but this tool will do just that.

06 Adjust the legs & feet

In this move the big arcs will be created by the legs, so as I am working in IK mode for them I will most probably end up setting a key on nearly every frame, especially when the legs are in the air. Be sure to create motion trails – not on the controls, but on a vertex on the model, such as the ankle or the end of the foot. This will create an honest representation of the arc being created by the leg's swing. Also, as the feet will be pivoting from the toe or the ball, it's important that when this happens there is no popping. I like to create a locator at the point where the foot will pivot from, then use that as a guide to position and orient the foot. If the foot slides around, we will lose believability in our animation I.





E The many key poses used in this complex shot

F The various breakdown poses to finish the initial blocking process

G If the animation is not clear and readable, look at retiming what you currently have

H Work from the core outwards, implementing the principles applied to a bouncing ball

I Focus in on the arcs and check the movement when Box Boy pivots

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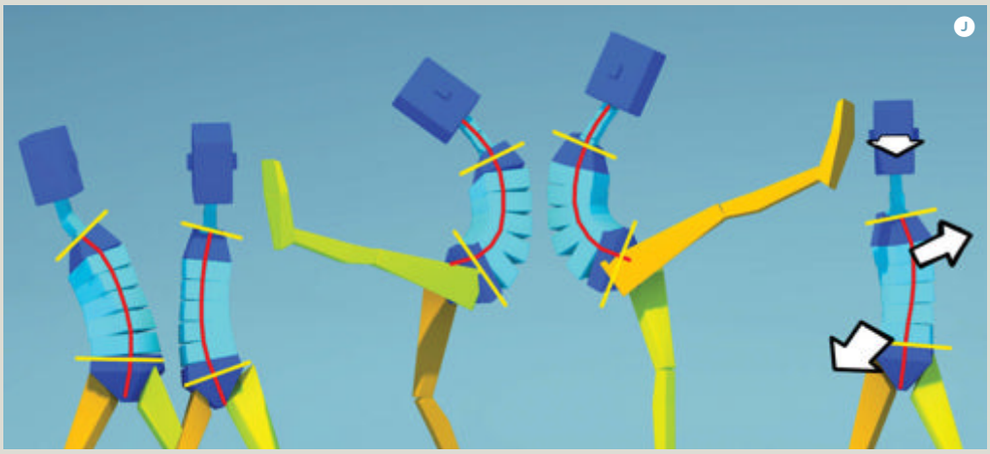


Reference

Some people will sometimes frown upon the use of reference and will tell you that a good animator should be able to work without it. However, everyone from the early Disney pioneers to the brains behind *Avatar* have used reference. Whether it's photographic reference that you will draw beside, or mo-cap reference that you can take into a 3D scene – whatever will get you to your goal in the most-efficient manner and give you the best results, do it. Be flexible and in the words of the mighty Bruce Lee: "Be like water, my friend".

07 Animate the spine, neck & head

We're starting to work up the torso, so as all the upper limbs are children of the spine we'll start there. Again, begin by cleaning up the curves and getting rid of any keys that aren't helping. Push the shoulders and hips to really get some striking poses from the opposing lines. Also, add twist to the torso, orient the chest in one direction, the hips in another and the head in a third direction. This will add further interest to the poses and make them more dynamic. Try to delay the neck and head slightly, making sure the path of action on the head is smooth and clean as it swings J.

08 Work those arms

When dealing with the arms, I like to work on them separately as I can really fine-tune one arm without the other distracting me. I use selection sets to hide some of the geometry and focus on those arcs once more. Although the arms will follow the torso, we will still need to go in there and clean out some of the poses as they may be jittery in places. Also, make sure to edit the spacing, as in some instances we will want to ease in and out of the key pose to reduce what could be some very quick movement in a small number of frames. This applies, for example, when the right arm reaches the peak of its move K.

09 Add drag & break up the timing

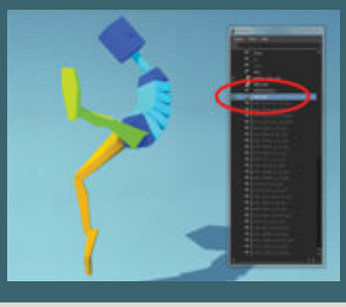
At this stage I want to make the motion as smooth as can be, as well as begin offsetting some parts so we don't come to the final pose and hit it as one lump. I'll delay the arms by a couple of frames from the spine and in the odd frame. I'll then push the lower arm further back than naturally possible to really help sell the drag. I'll delay the hands and also really push the fingers back to help sell the path of action that they'll be following. To loosen up the approach to the final pose, I'll make sure the arms hit the pose a few frames later and also have one arm hit the final pose a frame or two before the second arm does L.

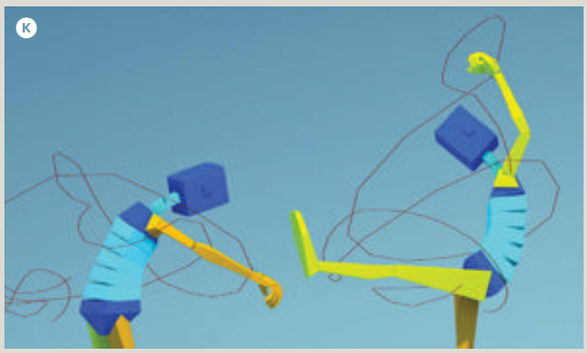
10 Keep on moving

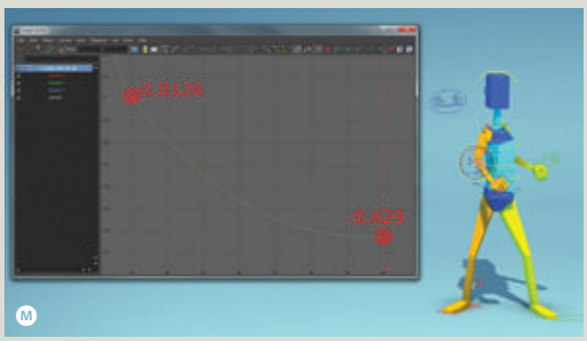
As we hit the final frames, we'll want to keep the motion and the character alive. To do so, we can employ the technique of using Moving Holds. For the hips, the upper-body and arms, I'll add a small amount of motion, continuing through to the final frame of the animation. It's important to keep this motion, moving in the direction that the body is travelling. The change in movement from the final pose to the final frame may be barely noticeable, but the difference between subtle movement and no movement can be huge to the naked eye. Finally, good luck and happy animating! M.

Show & tell

I like to focus on a particular aspect without my mind being side-tracked. For example, when cleaning up the spine, I don't want to look at the arms or even the legs. To help, I use selection sets. Simply grab all the geometry that you want to hide and go to Create> Sets>Quick Select Set. By the end of the animation I have a selection set for each part of the body. To select the geometry in the set, either go to the Outliner and open the specific set you want to hide/reveal or go Edit>Quick Select Set to pick the group.







J Use contrasting shapes in the torso and be more dynamic by adding strong twist poses

K Work on each arm individually and further refine those naturally occurring arcs

L Add some drag to the hands and fingers to create a flexible and natural animation

M Apply a subtle amount of motion to the final frame to keep the character alive

3DArtist

Masterclass

Gustav Melich shows you how to use DOP simulations with Bullet and the FLIP fluid solver to create dramatic scenes in Houdini 12...

With the Disc

Tutorial files:
- FLIP_RBD_v108.hip
- 3DA_Issue_51_fluid_particles.mov
- 3DA_Issue_51_windows.mov
- 3DA_Issue_51_final.mov
- Tutorial screenshots

Flood with Houdini

"I'll show you how to create a scene filled with destruction, including the modelling, fracturing and dynamic setup"

This tutorial was inspired by a photograph of an art installation depicting an elegant building with columns and large windows destroyed by a cascade of glass or ice breaking through into the space. I wanted to create a scene that I could flood in a similar way with water, shattering the windows and causing the glass to float.

This subject matter is perfect for a destruction tutorial using Houdini 12, as we can take advantage of some of the improvements that this version of the software offers. The FLIP Fluid Solver, for example, can be used to simulate water flooding into the building. In Houdini 12 the new FLIP Fluid Solver is faster and can handle much larger data volumes, which means we can generate bigger and longer simulations with many more particles. The workflow is simplified and the legacy-simulation issues have been resolved. Accurate distribution of simulations without boundary artefacts is now easy and the surfacing quality is also better.

To simulate the shattered windows, the new built-in Bullet Solver DOP can be used. Bullet is a commercial dynamics engine originally developed for videogames, known for easily handling thousands of objects fast. Having it in DOPs offers an easy way to create realistic-looking destruction effects. On top of all this is the challenge that the Fluid and RBD simulations need to interact with one another, so we need to couple the solvers.

The building will be constructed procedurally using simple boxes for the walls and the ground. The columns and the roof will be created by combining more complex shapes and using Boolean operations. To shatter windows there are two different approaches: pre-fracturing the geometry at modelling time, or using dynamic fracturing. The dynamic-fracturing process is driven by the dynamic simulation and it happens during the simulation. Even though pre-fracturing can be a time-consuming process and requires extra disk space, it gives a lot more control.

We will use the first method and apply a well-used fracturing process called the Voronoi fracture. This method is based on the Voronoi mathematical diagram, which creates a special kind of decomposition of 3D space determined by distances to a set of 3D source points. We will scatter points on the surface of the windows in our scene and use these as source points for the Voronoi fracturing process. This creates a natural breakdown of the window into hundreds of pieces. To eliminate the Voronoi look and make fragments appear

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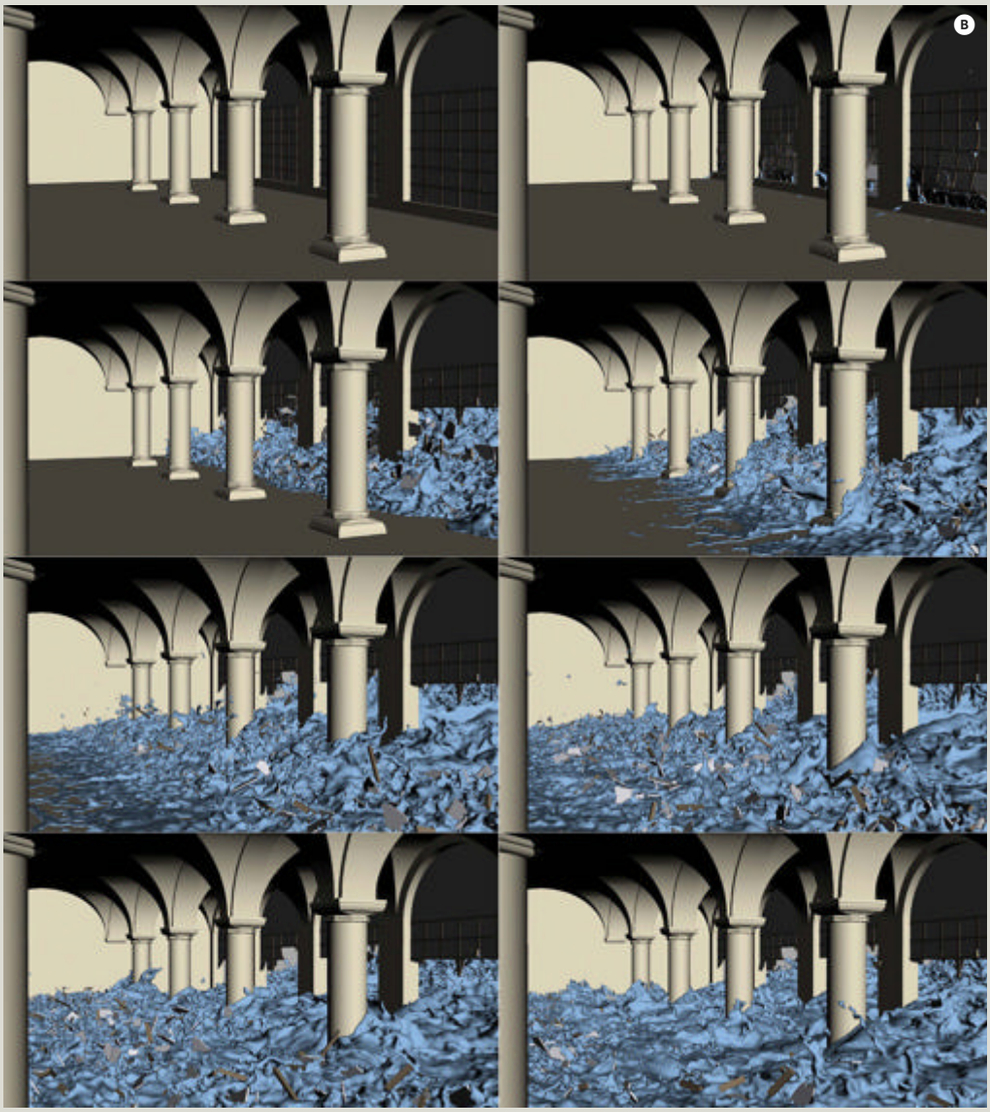


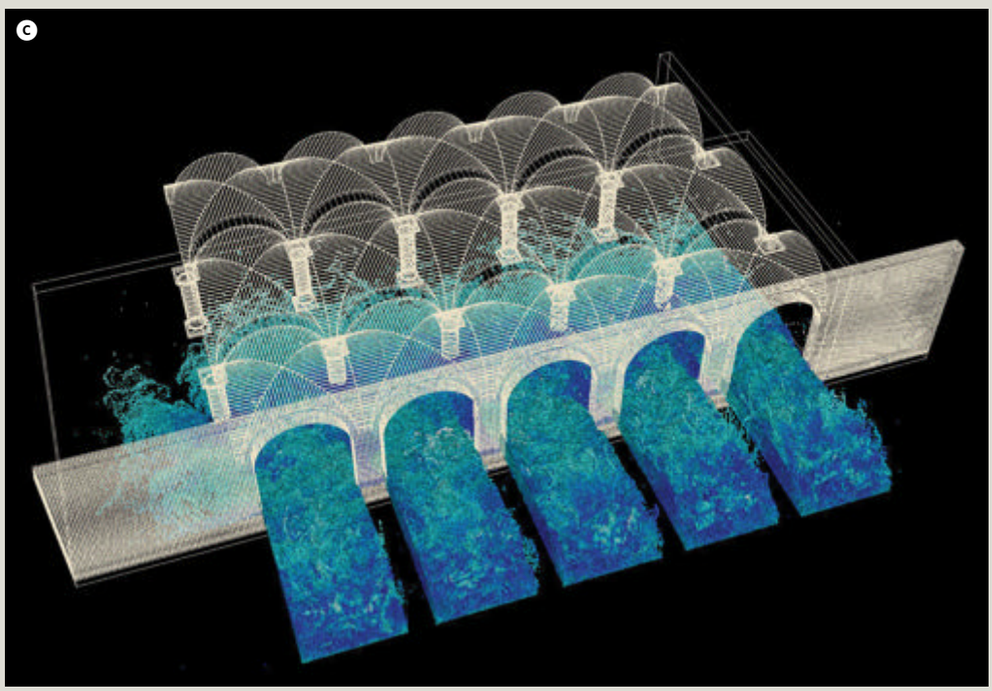
more like shattered glass, procedural noise will be applied to the pieces.

For the FLIP fluid simulation we will use a box as the source for every window separately. We could build one large source for all the windows, but then the fluid simulation would have many more particles, which would unnecessarily slow everything down. We will apply procedural noise to the shape of the sources and the velocities to make sure we have a random fluid emission. We'll build extra geometry around the sources and use the existing building geometry for collision. Houdini's FLIP Solver uses volumetric representation for its collisions, so we need to make sure that the SDFs (Signed Distance Fields) for the geometry have enough resolution.

For the RBD (Rigid-Body Dynamics) simulation, the building geometry will be used as static collision, represented as either boxes or As Is inside the Bullet Solver. The glass pieces will be used as dynamic RBD-fractured objects, represented as convex hulls for faster collision computation. To make the fluid and rigid-body simulations interact with one another, we have to increase the FLIP Solver's Feedback Scale value. Setting it to a low 0.5 value creates a fairly stable simulation. Since the fluid moves very fast, when the glass pieces collide with it some of them will move and spin too much. Therefore, an RBD State node will be used, where we can clamp the Linear and Angular velocities of the objects.

The output of the fluid simulation will be fluid particles. To render the fluid we will convert these into a fluid surface using the Particle Fluid Surface SOP. To generate a clean fluid surface we need to eliminate particles that are not part of the main fluid body. To group these lonely particles we will use a VOP SOP to compute the number of neighbours in proximity and check if this number is less than a certain threshold.

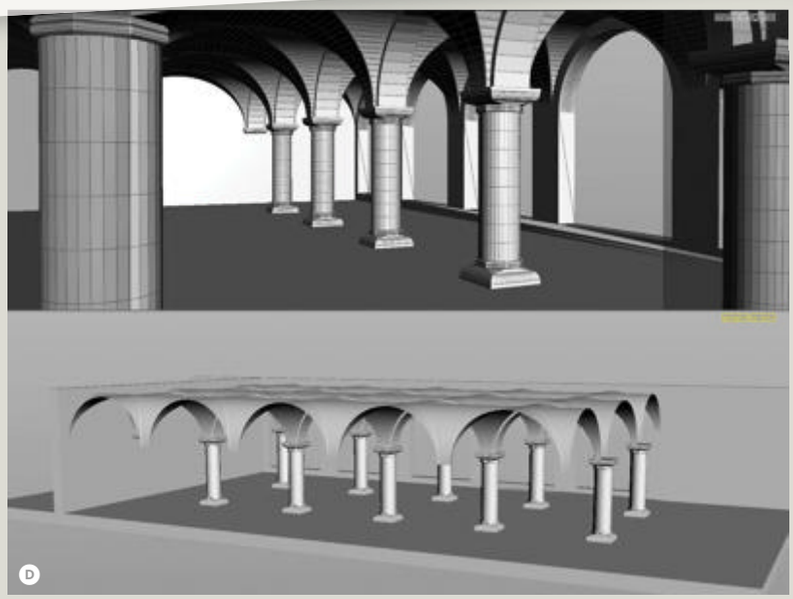
For lighting, we'll use an environment light and a set of point lights to ensure every part of the scene is lit well. For rendering, we'll be using micropolygon rendering with higher Pixel Sample values. It can take a very long time to render the whole 400-frame sequence in 1,080 HD. You can find the HIP file, screengrabs and movies supplied with this tutorial.



A A rendered image of the flooded interior

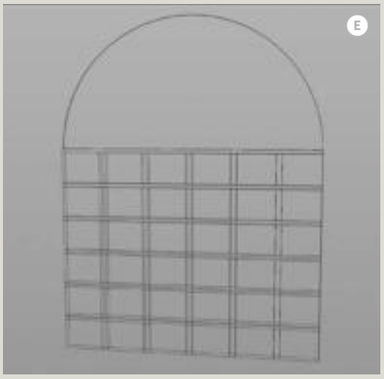
B Some frames showing the final simulation of the water flooding in

C Multiple fluid sources can generate several smaller volumes of fluid, instead of one big volume. This adds more variety



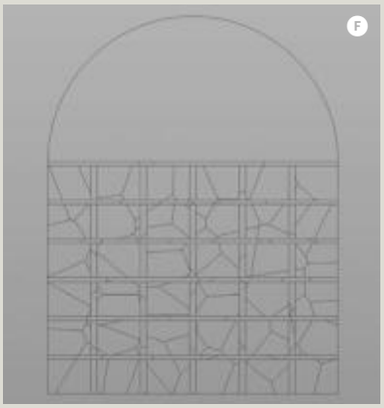
01 Model the building

Open the HIP file (supplied) and familiarise yourself with the layout. Select the Building Geometry container and hit Enter to jump into it. As you can see, we're using boxes to create the ground and the walls. For the wall with the windows, build the shape of the window using the Circle and Add SOP, then use the PolyExtrude SOP to add depth. Duplicate it five times with the Duplicate SOP, then remove the intersection from the wall geometry using the Cookie SOP. The columns are built from tubes and boxes and the roof is constructed using half tubes D.



02 Create some windows

Use boxes to create the basic shapes, then duplicate them evenly, both horizontally and vertically, using the Duplicate SOP. Next, build the basic shapes for the frame and duplicate them the same way. To create the top glass part, first use the Circle SOP. To add depth, first extrude the glass, then frame parts by a different amount. It's very important to make sure that none of the pieces interpenetrate, which can cause issues with the rigid body simulation E.



03 Apply fractures

To create the source points for the Voronoi fracture we'll use the forward-facing side of the bounding box of the window geometry. Distribute points on this using the Scatter SOP with two sets, since we want denser fracture for the glass. Next, use the Voronoi Fracture SOP with the point sets to create the fragments. This tool creates a group of convenient attributes, which help later to identify spatial relationships. Tag the fragments with a primitive attribute to determine if they will ever become active in the RBD simulation F.

04 Set up the RBD network

Now we'll create static rigid-body dynamic objects from the walls, columns and the ground geometry. Since DOPs represent collision geometry for fluid simulations as SDF volumes, we have to make sure that we have the right settings. Turn on Show Collision Guide Geometry on the Volume tab and change Uniform Divisions until the SDF looks correct. For the windows, use the RBD Fractured Object DOP. On the Rigid Body Solver DOP, set the Solver Engine to Bullet and leave the Geometry Representation at the default As Is. We can also set the Collision Padding to 0, since our geometry fits perfectly G.

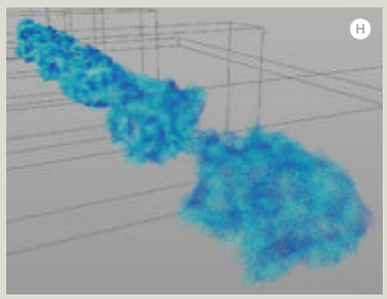
D The building as a polygonal model

E One of the windows with the frame

F Low-resolution fragments of the window element

G Examples of RBD nodes in the DOPs' context

H The fluid emitters at the reference frame



05 Assign the FLIP fluid

Now we have five windows in the building and all of them need to be hit with the incoming torrent of water. The main problem here is that this is a relatively big area to work with, so if we want to fill it up with fluid it will need a lot of particles, which will be very slow and also require lots of memory. Instead, we'll build extra geometry outside the building to divide up the space into many smaller areas. Use these walls as static collision for the fluid simulation. We'll also add boxes as fluid sources for every area, which will generate lots of fluid particles for the simulation. Make sure that the Uniform Divisions option for the collision SDF representation is high enough for the walls H.

Control the resolution

On the FLIP Fluid Object node in the DOP network, the first and most important parameter is Particle Separation. This parameter controls the interaction distance between particles. Decreasing its value will reduce the distance between the particles, making the fluid more detailed and realistic-looking. It also means more particles, which will increase simulation time. Since Houdini uses metres by default, the setting for Particle Separation is 0.1 (10cm). This is a good starting value to get a feel for how the simulation will look, but for the final simulation lower values need to be used. For large-scale simulations, 0.02 (2cm) is the threshold that provides stability, as smaller values can cause problems.

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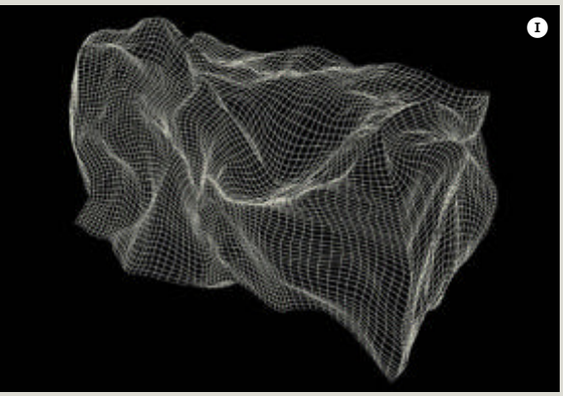
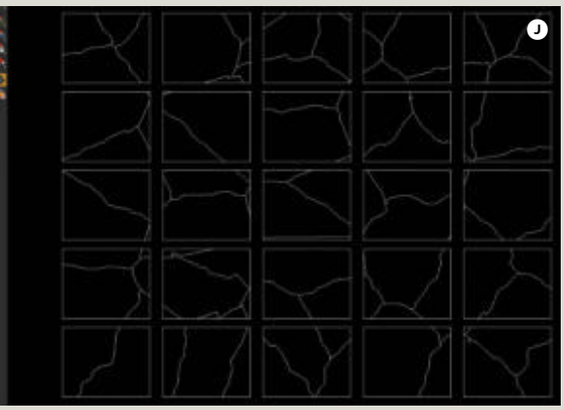


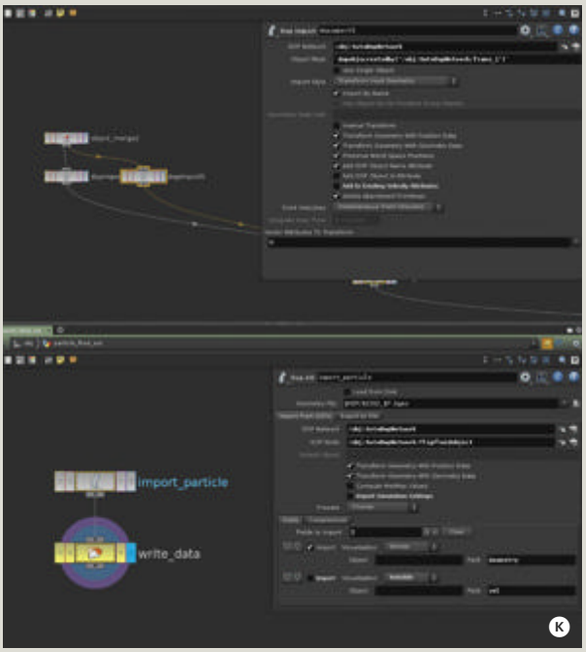
06 Make the fluids look even more realistic

There are couple of things that can greatly affect the look of a fluid simulation. Possibly the most important is the emission of the particles. We always want to make sure that our emitter is non-static and the initial velocity of the particles is as random as possible. To do the former, we'll use a VOP SOP, apply Turbulent Noise to the box and animate the Offset value. For the velocities, turn on Add Curl Noise on the Fluid Source SOP Velocity Volume tab. Set the Scale and Swirl Size to 1 and leave Animated on to make sure the noise will change for every time step I.



07 Detail all the fractured window elements

Voronoi Fracture is a great tool, but it has some shortcomings. One of the main issues with it is how it looks, generating very similar-looking convex pieces. For a realistic fracture this is unacceptable, but there are different techniques that can make it look better. One approach is to add noise to the fragments after the fracture. This will break up the undesired pattern and help achieve the look of broken glass. To do this, loop through every glass brick and resample the points on the lines to create enough points to displace by the noise. Next, group the inside points and add noise to their position J.



08 Export simulation data

Running RBD and FLIP fluid simulations in Houdini will generate lots of data, but the program offers different ways to save the data to disk. We can use the File DOP to write simdata files to disk, which will dump every bit of information. These files are usually huge and reading them back in can be slow. Also, unless we want to use simdata for secondary simulations, we don't really need all the information. From the fluid simulation we only need the particles and the velocity field. From the RBD simulation we need the transformed bodies. To get the necessary fields from our simulation we'll use the DOP I/O SOP to import Geometry and vel, then use a File SOP to write it to disk. To export the transformed bodies, use the DOP Import and File SOP to write it out K.

09 Surface the fluid

The output of the FLIP fluid simulation is a huge set of particles representing the water. Houdini enables the Particle Fluid Surface SOP to create a surface out of them, so it's best to set the Step Size to half of the Particle Separation and lower the Point Radius Scale. Enable Filtering and set the Filter Width to 1 or 2. If there are particles singled out (lone particles), these usually will get surfaced into individual spheres, which don't look impressive or realistic. To resolve this issue, use a VOP SOP to count the number of neighbours for every particle in a specified radius, then just remove all the particles where the number is under a certain threshold of your choice. Using this method we can eliminate any of the unwanted artefacts L.

I Animate noisy source geometry for emission

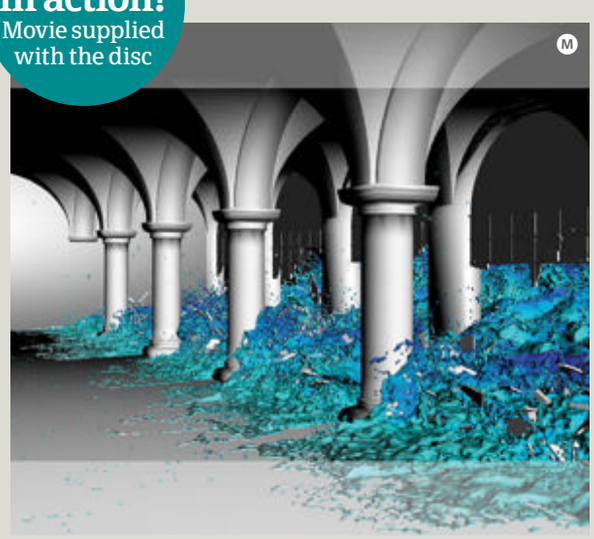
J Adding noise to the fracture at a relatively low resolution level

K Only the necessary data will be exported to disk

L The surfaced particles with speed mapped into colour

M The scene setup with lights and a camera angle

Watch it in action!
Movie supplied with the disc

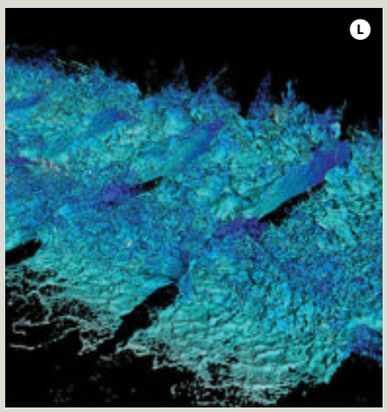


Setting up your Bullet collision

If the geometry matches any of Bullet's built-in collision shapes, we can set the Geometry Representation parameter on the Bullet Data tab to the right shape type. If this isn't the case we can set it to As Is and Bullet will build convex hulls out of the pieces for collision. If the pieces are concave then turning off Polygons As Convex Hulls will force Bullet to use the incoming geometry without any conversion. If a simulation produces undesired collision results, check the setting for Polygons As Convex Hulls first.

10 Lighting & rendering

Don't assign any materials, just add primitive colour to the bridge and the mountain geometry. Create a Light Template and assign a GI Light shader to it. For rendering, use Mantra's micropolygon rendering and for the still image use the default settings for everything except Pixel Samples. This option is the number of samples that are filtered to get the colour for a pixel, affecting the quality of the render greatly. Here we've used 6 x 6 to avoid any artefacts M.



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Blender
Filippo Veniero
www.ifilgood.it

This open-source-software-fiend likes to emphasise the simple things in life, focusing on ambience and lighting to achieve realistic results

Sculptris
Timur 'Taron' Baysal
www.taron.de

Taron was a freelance artist in Germany for several years before moving into animation and VFX in Los Angeles. He now works as a software developer

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Cloth simulation

"How can I create realistic cloth using Blender 2.64?"

With the Disc

Tutorial files:
- Find the BLEND file, all the textures (images and vectors) and video footage of different cloth settings
- Tutorial screenshots

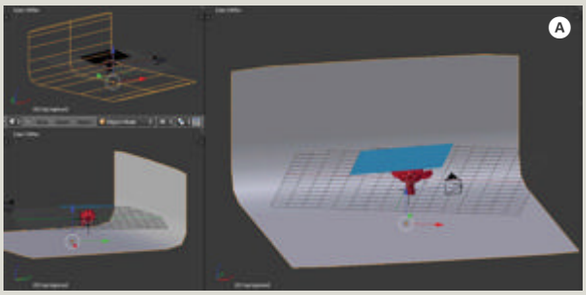
Anyone dabbling with CG will, sooner or later, have to work with cloth simulation: a curtain in an interior, a dress, a T-shirt on a character...

When we set a mesh as cloth, Blender's physics engine treats its vertices as if they were connected to a network of springs. The various parameters – such as material structure, material bending, spring damping – determine how much the springs can extend and contract, and at what speed. In this way we can create stiff fabrics such as leather, soft ones like silk, or elasticated textiles like rubber.

In the Cloth panel there are some fabrics ready to use: Cotton, Denim, Leather, Rubber and Silk. However, we can simulate any other fabric we like by changing the following settings:

- **Quality:** This slider drives the simulation steps per frame. A higher quality gives a more-realistic simulation.
- **Mass:** Greater Mass provides you with a heavier cloth.
- **Structural:** This defines the stiffness of the structure of the cloth.
- **Bending:** Is the wrinkling coefficient? Higher values result in bigger wrinkles.
- **Spring:** This is the dampening of the cloth's velocity.
- **Air:** If set to zero, all cloth will fall down with the same velocity.
- **Velocity:** Reducing the Velocity will help the cloth reach the resting position faster.
- **Pinning:** This enables the pinning of some vertices of the mesh.
- **Cloth Cache:** In this panel you'll find both the Bake button and the Disc Cache Enable button.
- **Cloth Collision:** With this panel we can set parameters that indicate how the cloth mesh interacts with other meshes and with itself.
- **Distance:** The minimum value between the cloth mesh and the Collision object is very important.
- **Friction:** Is this coefficient between the cloth and object? See 'cloth_setting_test.avi' (supplied) for some cloth tests.

Here we'll create convincing cloth, moving from the settings in Blender's Physics panel to creating a texture in Inkscape.



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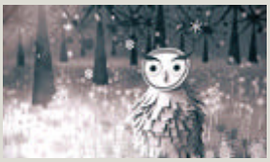
modo & HDR Light Studio

Richard Yot
www.itchy-animation.co.uk

Richard is an illustrator specialising in creating quirky characters and worlds for them to live in. He enjoys giving CG work the charm of handmade things



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01 Set up the scene

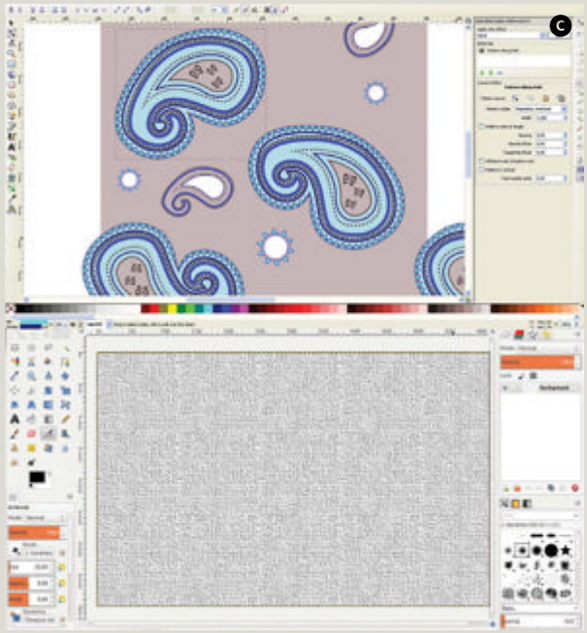
The scene is very simple to lay out. First add the monkey mesh (good old Suzanne) in the centre stage, set it to Smooth and add the Subsurf modifier. Apply a plane under Suzanne, then in Edit mode, extrude two vertices along the Z axis. Set the mesh to Smooth and add Subsurf if necessary. You can add loops to make this less curved. The last mesh to insert is a plane above Suzanne (the cloth in the simulation). Set it to Smooth, divide the mesh in Edit mode twice and add Subsurf again A.

02 Start the simulation

In Object mode, select the plane under Suzanne and in the Physics panel enable Collision (the default settings will be fine). Repeat the process with Suzanne, select the plane above her and enable Cloth. We'll slightly change the default settings, increasing the Quality to 20 steps and the Density of Air to 4 (this makes the cloth more stable). In the Cloth Collision panel, set the Quality to 10 and enable Self Collision (Quality 5), so the mesh also interacts with itself. You can now press Bake and take a coffee break B.

03 Begin texturing

Next, open up Inkscape and create a closed path. Use Pattern Along Path with a simple pattern (such as a circle or a triangle) and with the Inset command create an internal path (with different colours). Duplicate objects so that the left edge aligns with the right and the upper edge with the lower. Export the image as a bitmap, open GIMP, create a new image and go to Filters> Artistic>Apply Canvas. Now you can save your image as a JPEG file C.



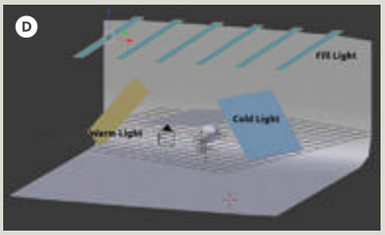
04 Shed some light

Your lighting setup is critical to obtain a good render. Here we'll use a studio lighting setup: two lights at the side (one warm and one cold) and some Emitter planes on top of the scene (fill lights). This simple but very functional configuration gives realistic reflections on the fabric. Don't forget to set the Ambient Light in the World panel to zero, otherwise our render will have low contrast D.

Troubleshooting

Sometimes the cloth mesh intersects with the collision mesh during the simulation. Here are a few tips to solve this problem:

- The first solution is to increase the Quality of the simulation in the Cloth panel. In this way the probability that the collision object will get caught will be higher.
- If the problem remains, increase the Distance in the Cloth Collision panel, although doing this means the simulation will be far less accurate than before.

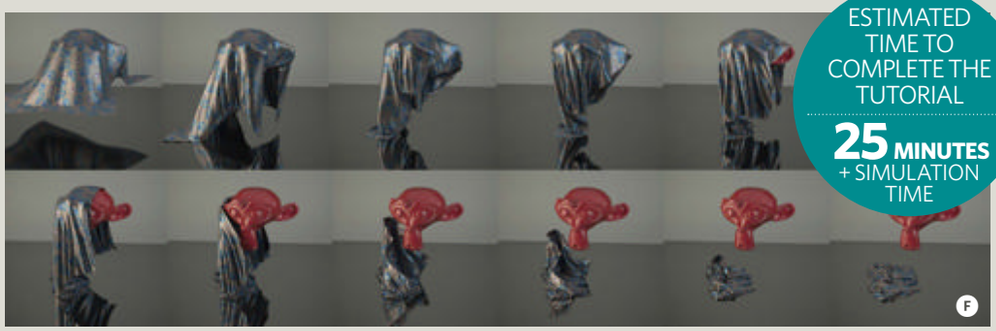


05 Use materials

We'll now focus on the material of the fabric. Go to frame 0, select the cloth mesh and unwrap it in Edit mode. Add a new material, using a mix of the velvet and glossy shaders, then a texture node (load a seamless texture) and connect it to the two shaders. Next, add a mapping node to the texture node and change the Value Scale to reduce the size of the pattern. You can now use another texture node (with the canvas image) to mix the two materials E.

06 Move to rendering & post-production

To render we'll use Cycles, so choose a good camera angle, set Suzanne at the centre of the frame and render the scene. Using a 500 pass for a medium-res image is about right and we'll also use DOF to provide the image with more depth. At the end of the render, use GIMP to increase the contrast with the Curves tool. If you want to render a video, select a video format in the Output panel and click Animation F.



ESTIMATED TIME TO COMPLETE THE TUTORIAL

25 MINUTES + SIMULATION TIME

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5 HOURS

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• Tutorial screenshots

modo Replicators

"Is there a quick and easy way to populate environments for a highly stylised effect?"

Using Replicators in modo 601 enables you to very quickly populate a scene with a relatively small number of elements. This approach is suited to stylised images, as imaginary worlds can be created using a small number of assets. These can be spread in the scene with precise control.

Characters can also be created from replicated elements, or in this case by using fur to create paper-like strips. It's also possible to use textures mapped onto the fur to achieve many different results.

Aside from using Replicators, it's possible to use modo's Mesh Paint feature to place instances accurately within a scene. By combining these techniques, artists have access to some great tools for shaping scenes with a great deal of complexity. These scenes are even easier to manage and can save precious memory.

The techniques outlined in this tutorial can also be applied to more realistic scenes. With a greater variety of prototype meshes available for duplication, some really complex environments and vegetation can be achieved. By using stencils and low-polygon meshes, even very detailed scenes will remain light on resources. Combined with modo's powerful render engine, these can be rendered quickly and efficiently.

The real benefit that Replicators offer is speed, as it's this that enables a scene to be populated using a very small quantity of assets. For a stylised illustration this is very useful, since the limited number of assets doesn't look out of place and the image can be created very quickly. In this scene the environment consists of only one type of tree, two types of flowers, two snowflakes and some floating dust. This is a total of six very simple items that are then duplicated to fill the scene and make it appear to be densely populated.

Particles that control Replicators can be positioned with a great deal of accuracy using the Particle Paint tools, which enable artists to place particles interactively. If the Replicator is already defined, then the results can be seen in real time in the OpenGL Viewport. Combine this with the Randomisation options that are available with the Replicators and a great deal of variety can be achieved very easily, quickly and with complete control.

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01 Create paper fur

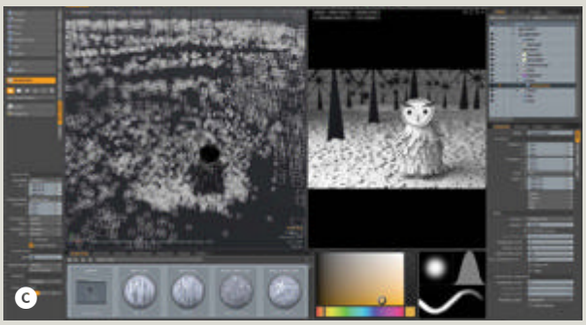
To create the strips of paper, select the polygons that define the area where you want them to appear and assign a new material to them. Add a fur layer to that material and set the Fur Type to Strips, with no tapering. Turn the Jitter options down to zero to keep the fur even and add some Flex and Root Bend to make it curve A.

02 Place the trees

To position the trees, the Mesh Paint tool is the best option as it offers the most precise control. Select the Ground object in the Item List, activate the Mesh Paint tool and set it to Drop mode with the tree mesh as the source. Now you will be able to quickly place, orient and size your trees interactively in a couple of minutes. Try to shape a plausible pattern without fixating on it too much B.

03 Scatter some flowers

The flowers are far more numerous than the trees and do not need such precise placement, so they will be replicated with particles. To define where the replicas will be scattered, use the Particle Paint tool. Select the Ground object, then activate the Particle Paint tool in the Paint tab and simply paint where the flowers should appear. If you define your Replicator before this step you'll see it update C.

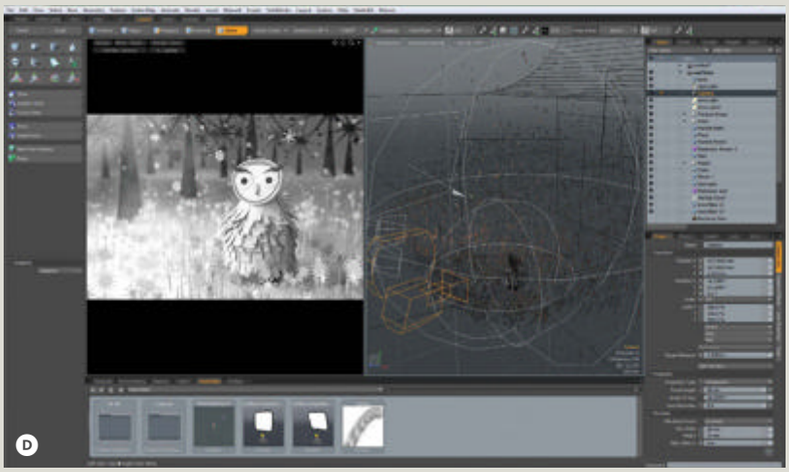


04 Position your snowflakes

The snowflakes will also be replicated, but this time by creating a particle cloud to control their placement, since they will need to float in the air. For variety, add a number of different snowflakes and define a group from them, which will then be used to vary the prototypes being replicated. Use the particle cloud as the Position Source and change the Random Seed to find an arrangement D.

Duplication tips

While modo 601 doesn't yet have dynamic particles and emitters, it does have ways of generating static particles, which are very useful for object duplication when used in conjunction with Replicators. There are Particle Generators, Surface Generators, Particle Clouds, Mesh-based Replicators, Texture-based Replicators and so on. With these it's possible to create different types of arrays, from organic to symmetrical types such as helixes or grids.



05 Fine-tune your scene

If you are not happy with certain aspects of your replicas' positions, you can alter them manually. For example, with the flowers that are positioned using the Particle Paint tool, simply select the particle mesh that was created when the tool was applied. Then, in Vertex mode, select an individual point and move the flowers. You should see their associated replicas will move along too. There are also particle-sculpting tools that modify particles E.

06 Work up some dust

As a final touch, another Replicator can be added to the scene to create floating dust. The prototype is a simple sphere with 100% Transparency and some SSS. Another particle cloud can be used to distribute the dust in the air. Adding some randomisation to the size of the dust particles creates a nice effect. With DOF enabled the dust will look very convincing as subtle specks of bokeh in front of the virtual lens, completing your stylised scene F.

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Tutorial files:
- Sculptris_Drag-on.avi
- 32-minute video tutorial

ESTIMATED TIME TO COMPLETE THE TUTORIAL
30 MINUTES

Sculptris

Create detail with masks

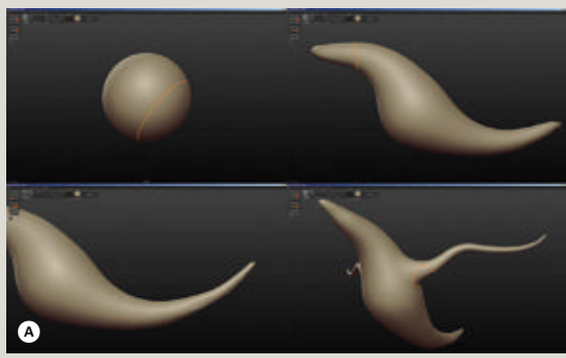
"Is it possible to create detailed sculpts using free software?"

If you can find your way around Sculptris but can't quite work out the next step, let's look at a few of the tools to see how we can get some great results. First up, we'll explore the power of the Grab brush to create a fantastical creature. This may not be the most elegant feature in Sculptris, but if used correctly it can really make magic happen. I'll also introduce some exciting ways to use the Mask brush.

Both the Grab and Mask brushes create geometry like others do, but the Grab brush enables you to generate whole new sections of your model by just grabbing the polygons and dragging out features, such as the tail, neck and wings of a dragon. With the Mask brush we'll isolate an area to work on, avoiding unwanted contact with neighbouring polygons. We'll also use it to create entertaining details, as you will see in the following steps.

You might think that six steps are too few to explain the sculpting of an entire mythical creature such as a dragon, in which case you'll find a 32-minute-long video tutorial supplied for further learning. Ironically, it was this time limit I set for myself that inspired me to leave out arms and legs on this character, which aren't needed as these six steps aren't concerned with creating the whole dragon. Here we aim to inspire your work in Sculptris with the wonderful Grab brush and to help you creatively explore the use of masking.

We'll also be using Reduce Selected for reasons beyond reducing the amount of polygons. This feature can also optimise the geometry for manoeuvres that may risk Sculptris crashing as we go across the symmetry line. When we add a greater amount of detail close to the centre line, we risk teasing the inner beast of Sculptris, which can bite when it gets dicey. The



Reduce Selected option doesn't just melt away potentially redundant polygons; it also re-evaluates the whole geometry and corrects possible confusion. We'll be using Pinch and Inflate as well, but only to make minor adjustments. While Pinch can be essential to some design approaches, Inflate is rarely a driving design tool. Now let's get started!

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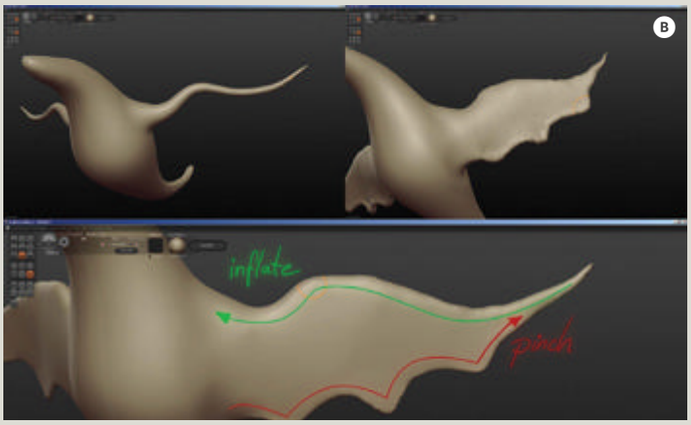
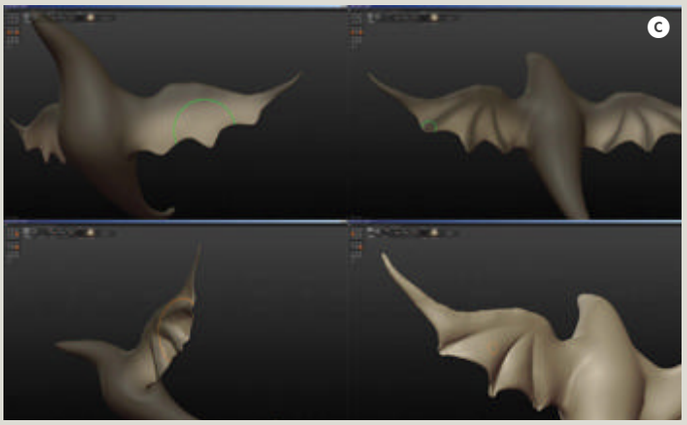




01 The Grab brush

One of my favourite brushes has to be the Grab brush (G). We'll start with a ball, rotate the view around to the side and immediately grab the back of it to drag out a tail. Then we go to the front end and drag on the neck. Rotating half way to the front view, we reduce the size of our brush tip, grab hold where shoulders would be and get our wings started A.

02 Layer on details

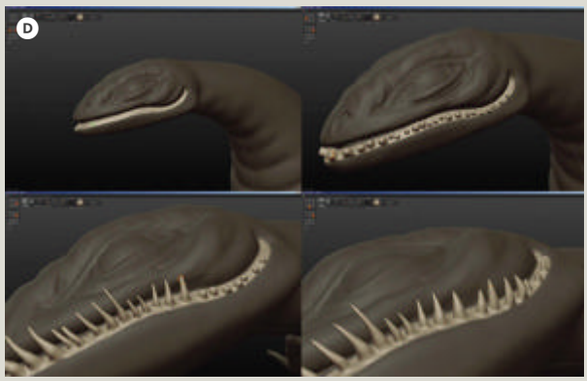
With our wings started, we still use the Grab brush to carefully stretch out the membrane of the wing. A slight wriggling with the brush stretches out the geometry, much like pizza dough. Keep in mind the anatomy of an arm when designing the wing and where the fingers will go. We pinch around the lower edge and carefully inflate across the upper edge to create more polygons, then refine the outline together with some smoothing B.

03 Mask the wing

Hit Cmd/Ctrl+D to mask. Then, using the Mask brush sized at about the wing's width, we can fade away the mask from the lower edge of the wing towards the arm. With Inverse, brush back in the fingers from the hand toward each tip, first with a tiny and then a larger brush size to create a smoother transition from the fingers to the membrane. The Grab brush and Smooth will do the rest; hitting Cmd/Ctrl+A unmasks all C.

04 Add in the teeth

Last issue we covered basic head modelling (issue 50, page 92). This time, we'll take a look at creating some spiky teeth. As we've just done, we need to mask everything and then just brush away the mask on the lower lip. With the Draw brush and Airbrush mode on, we can simply lay down each tooth. With the Grab brush we can then pull each tooth as long as we want it. Using Pinch we can make each tooth pointier, or use Smoothing carefully D.



05 Apply the Mask brush further

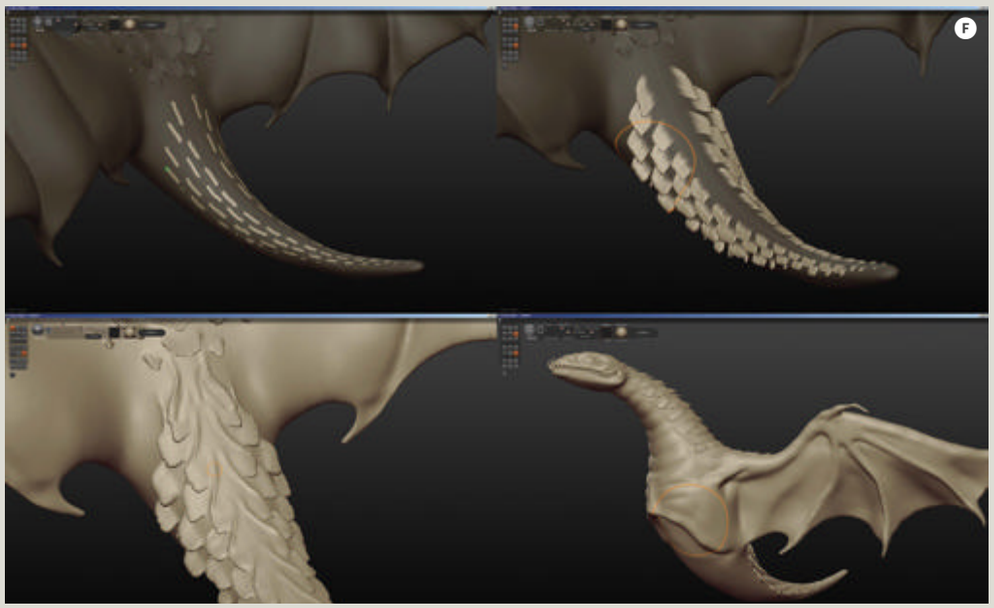
Again, mask everything and use the Mask brush to draw roots of scales onto the dragon, from behind the head and down the back. Layer them like bricks, going a little onto the shoulders. We can then use Grab to drag scales out of those lines. These may go into the dragon, but we can rotate to another viewing angle and just push them out again. Smooth over them and use Reduce Selected E.

06 Finish the tail

With the tail, choose a different direction for the lines, using the same principle. Smoothing should be done before using Reduce Selected since the polygon density of the scales preserves form F.

When in doubt...

Things can go sideways around the symmetry line under certain conditions. This can arise if a number of polygon-increasing manoeuvres have occurred near or across the centre. My advice is to use Reduce Selected at least once after larger actions, such as the scale-grabbing in the last two steps. Don't worry if your machine crashes, because Autosave should keep a stage close to where it went down and Sculptris will open it on restarting. When in doubt: use Reduce Selected! For more advice on modelling heads, check out my previous Sculptris tutorial featured in issue 50 (page 92).



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HDR Light Studio, modo, Maxwell Render

Product shots

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- Tutorial screenshots

How can I create convincing studio lighting for products & characters?

HDR Light Studio enables the very rapid creation of high-quality studio lighting. If you are the kind of artist who regularly renders products, cars, characters, or any other studio-bound type of scene, then it's definitely worth looking into this package, since it offers unparalleled speed and an excellent workflow.

The application enables you to place lights in real time around your subject and then bakes the result to an HDR image, which you then use for lighting in your software of choice. There are plug-ins and scripts available for all the popular 3D programs; the level of integration varies between packages, from simple export scripts to full integration. In this tutorial we'll be exploring both.

There is no doubt that full integration is the most desirable option because it will enable real-time updating in a render preview, meaning that any changes to your lighting can be seen immediately. Combine this with a high-quality preview renderer, such as Maxwell's FIRE, and you have an ideal studio-lighting solution.

For the less well-integrated plug-ins, however, updating is not instant. Instead, the HDR has to be baked and then previewed in the host application, which is a slower but still acceptable workflow. There is also a LiveLight viewport in HDR Light Studio, which enables accurate light and reflection placement – although it's no match for a full-render preview.

In terms of functionality, HDR Light Studio has some very nice workflows. For example, you can place highlights and reflections very precisely using a brush to define the exact point on your model where you would like these to appear. It's also possible to control illumination and backlighting with the brush controls.

HDR Light Studio offers both synthetic and captured light sources, with the captured variety including soft boxes, spotlights and windows, and synthetic ones enabling a variety of shapes. The synthetic lights are very powerful, with controls for Falloff, Size, Color and Shape. The results can be surprisingly realistic.

There is also an excellent Color Picker, controls for bulb placement and size and fully customisable falloff curves for the synthetic lights. This combination of tools enables the rapid creation of lighting setups with little effort. This all adds up to give artists a fully fledged studio to fulfil all of their indoor lighting needs, with lights that can be arranged in record time.

Join the community at www.3dartistonline.com

01 Set up your scene

We're going to use modo as our 3D application of choice. Since modo doesn't have full integration with HDR Light Studio, for the moment a script can be used to transfer geometry over. Then the HDR has to be updated before the results can be seen back in modo's Preview. The LiveLight view can be used for previewing the lighting and to paint highlight positions directly onto the geometry. The view can be customised to some extent, but this won't be up to the standard of a render preview A.

02 Adjust your lighting

The HDR Light Studio workflow is very simple: there are buttons at the top of the interface that enable you to add synthetic or captured lights, then you can use the main window to move them around the scene. There are also slider controls to change Size and Placement, as well as Falloff, Bulb Placement and Opacity. Additionally there are advanced controls for adding gradations, falloffs, blending modes, as well as a rather nice Color Picker B.

03 Bake the HDR lighting

To bake the lighting, click on the Render button in the HDR Light Studio interface. Here you must choose modo as the target, set the desired size and render the map. When rendered, the map should be assigned in modo as an Environment. Once set up, click Control Render to reuse the same settings and the map will update in modo when baked C.

04 Maxwell workflow

The workflow in Maxwell Studio is vastly superior thanks to the Live plug-in, which enables integration with FIRE. With your scene open in Maxwell Studio, set the Environment type to HDR Light Studio in order to create a live link between the two applications; you can then click the dedicated button to launch HDR Light Studio. Any lighting changes you make will now be updated in real time in the FIRE preview, which is a full-quality renderer D.

05 Edit the lighting

With the LiveLight plug-in you have an ideal workflow and you can see the results of your lighting with unparalleled clarity. To access the LivePaint functions you can open the LiveLight view and paint highlights on the proxy mesh (a kettle used as a stand-in) and watch the results in the FIRE render preview. This process gives a much better idea of how the lighting will react to the materials in your scene E.

06 Send the map back

When your lighting is complete you will need to once again bake the map, but with LiveLight the setup has a greater degree of automation. Click the Render button, select the location for the file to be saved and everything else will be ready. Once baked, Maxwell will update the scene automatically to use the newly created map. The process is painless, very efficient and your scene is ready to be rendered F.

Take HDR maps a step further...

You aren't limited to using the results from HDR Light Studio as they come and your HDR lighting can be greatly enhanced by post-processing the resulting maps. For example, to achieve extra realism you could add some bloom or diffusion to the HDR light maps. This creates some glare around the light sources with the Diffuse Glow filter in Photoshop or with a pro solution such as Magic Bullet Looks.

You can also perform further colour grading on your maps, or create blurred copies to aid with GI, or even add some 3D lights to the scene for extra control.

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: **www.3dartistonline.com/news/tutorial-files**

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US readers turn to page 15

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With fast rendering and computing performance, the WSX6 won't be slowed down by detailed scenes

Workstation Specialists WSX6

A Kepler-equipped single-processor workstation with top-end performance

The WSX6 is configured with NVIDIA's latest Quadro K5000 Kepler graphics card. We checked out Armari's Magnetar M32 AW750R (issue 50), a monster of a system filled with powerful hardware, including dual Xeon E5 processors and ECC memory that can chew through benchmarks as fast as it will eat a bank balance.

The WSX6 is different. Aside from the graphics card, the specification and cost of the customised variant seems much more down to earth. Rather than a Xeon, it has a high-end Intel Core i7 processor. But this is no mainstream desktop chip: the Core i7 3960X used in the WSX6 is a six-core, twelve-thread Extreme Edition model, suited for tasks such as rendering and video encoding. It uses the same LGA-2011 socket as Xeons, and is housed in an Intel X79 chipset motherboard.

Thanks to Workstation Specialists' 4.2GHz factory overclock, the gap in single- and multi-threaded performance between this CPU and a more costly Xeon running at factory speed should be slim. The eight memory slots in our customised WSX6 are filled with 32GB of non-ECC 1,600MHz DDR3 memory. This can be upgraded further by swapping the 4GB modules with 8GB modules. A fairly standard storage configuration is included, with a 240GB Intel 520 series SSD for Windows and software, with an additional 2TB hard disk.

The Quadro K5000 graphics card is a big chunk of the cost. With 4GB of DDR5 memory, 1,536 shaders, and 2,150 Gigaflops of power, it's a step-up from the performance of older Quadros. This is clear when comparing results with other systems that, six months ago, cost more than the WSX6. A score of 95.05 in CINEBENCH OpenGL is 50 per cent faster than a workstation we tested with a Quadro 4000. The CINEBENCH CPU score of 10.73 isn't far from a single Xeon E5, and in 3ds Max the WSX6 completed a short render test within 20 per cent of the record set by Armari's Magnetar M32.

The WSX6 isn't as fast as Armari's monster during longer rendering tasks, most notably in SPECViewPerf's Maya section, with a score less than half of the M32's. But the overall results suggest the WSX6 packs a hefty punch and could be a wise investment for those looking for a powerful workstation.

The good & the bad

- ✓ Nippy single-threaded computing performance
- ✓ Very quick with 3ds Max render times
- ✓ Offers powerful 3D graphics acceleration
- ✓ Plenty of system memory
- ✗ Marginally less capable with heavily multi-threaded rendering tasks than a Xeon E5 system

Essential info

Price: £3,395 (ex VAT)

www.workstationspecialist.com

OPERATING SYSTEMS

- Windows 7 Professional 64-bit

OPTIMAL SYSTEM REQUIREMENTS

- Intel Core i7 3960X overclocked to 4.2GHz
- NVIDIA Quadro K5000 GPU
- 32GB non-ECC DDR3 memory
- 240GB Intel SSD 520
- 2TB hard disk

For many computing tasks, a high processor clock speed has a bigger effect on performance than multiple cores

Our verdict

Features	8/10
Ease of use	8/10
Quality of results	8/10
Value for money	8/10

> The WSX6 excels at 3D and computing tasks that benefit from the extreme processor clock speed

Final Score 8/10

iClone Animation Pipeline
From £600 / $964 US*

iClone brings motion capture, pre-visualisation and character animation to the masses – all for a budget price

Get a full version of iClone 4 PRO with the disc!
See page 112

Taiwan-based software company Reallusion claims that its "must-have" tools for home-based motion capture and animation offer everything from pre-rigged characters to near-flawless Kinect integration.

Since iClone is designed for rapid production, creative education and cost-effective pre-visualisation, it has been quickly established with a prosumer level of simplicity. While we feel that the product is not perhaps marketed towards the high-end industry professional out of the box, thanks to a great deal of expandability and a desirable price tag, hope is not quite lost.

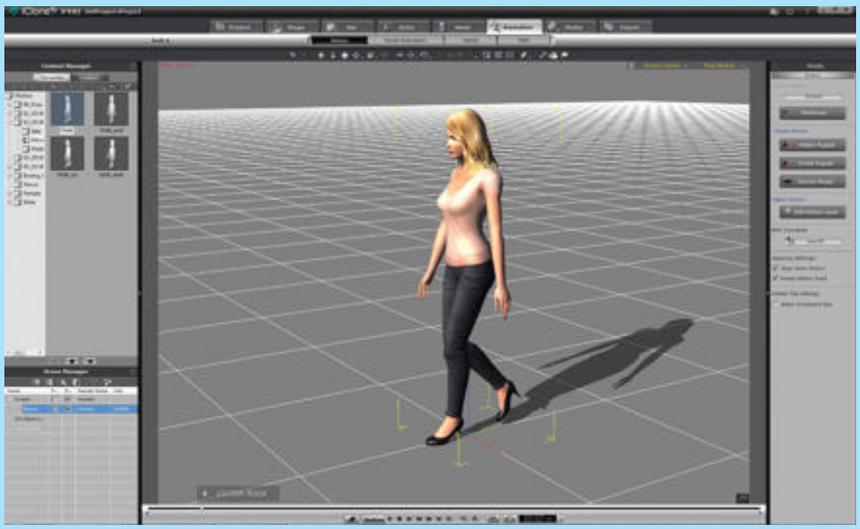
iClone5 PRO is a fully featured package, offering everything from inception to rendering. If you're looking to create an animatic as a project or create something for educational purposes, iClone is an ideal option. However, if you desire a more polished, professional output, then you're going to need 3DXchange. Included in the iClone Animation Pipeline bundle, 3DXchange helps you to create a pipeline output for the data that has been so painlessly captured in iClone.

Running iClone, it's clear that there are many great things that can be achieved, and experimenting with interactive props, physics and cameras couldn't be easier. Users can also purchase Reallusion's popVideo software (not currently included in the bundle) and composite content into digital sets and environments with ease using one-click chromakeying.

Judging from user experience and the speed at which a task can be accomplished, iClone is a dream: it integrates live-input motion capture with things such as basic rigid-/soft-body physics and staged 3D environments. Perfect for demonstrating the modern-day interaction between computers and humans in an educational or project-based context, iClone is loaded with prebuilt content. This includes several pre-made digital motion-capture actors and motions, fully-rigged with inverse kinematic capability.

Graphically, the iClone bundle is limited, however, offering performance on a par with (lower-end) PC games. If you are aiming to create something resembling *The Sims*, iClone is the place to go. However, if you're looking to create the next *Monsters Inc.*, iClone is only likely to be of use as part of a home-grown (budget) mo-cap pipeline.

The iClone Animation Pipeline bundle is great fun and a fantastic introduction for aspiring animators. However, professionals will likely shoot for bigger things for anything other than sketchy pre-visualisation. Overall, though, iClone represents an excellent package, both in price and relative performance. Just don't expect miracles.



iClone characters are highly customisable for near-infinite actor configurations, from the stylish to the bizarre

*Currency conversion correct at the time of publication

What's in the bundle?

The iClone Animation Pipeline bundle provides the user access to varying levels of functionality:

- iClone5 PRO is the most fully featured package in the Animation Pipeline bundle, offering advanced puppeteering, BVH conversion and voice-over/lip-sync tracks.
- The iClone Mocap Device Plugin enables real-time motion capture from within iClone, using a Microsoft Kinect camera.
- 3DXchange is a conversion and editing tool that connects iClone to professional applications such as 3ds Max, Maya, Softimage and MotionBuilder, to name a few.

iClone features interactive props, some of which can be effected by character motions using the built-in rigid-/soft-body dynamics engine

iClone offers incredibly simple motion capture, quickly applying recorded motions and templates to high-quality, pre-rigged, digital bipedal actors

Our verdict

Price: £600 / $964 US*
www.reallusion.com/iclone/pipeline

Features	9/10
Ease of use	9/10
Quality	6/10
Value	10/10

"An easy-to-use product that will best suit those starting out in animation"

Final Score 8/10

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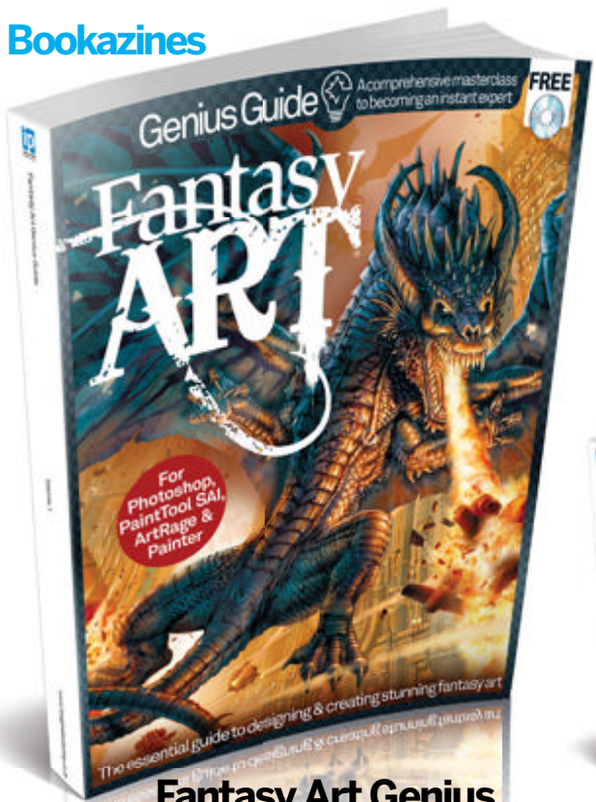
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Inside guide to industry news, studios, expert opinion and education

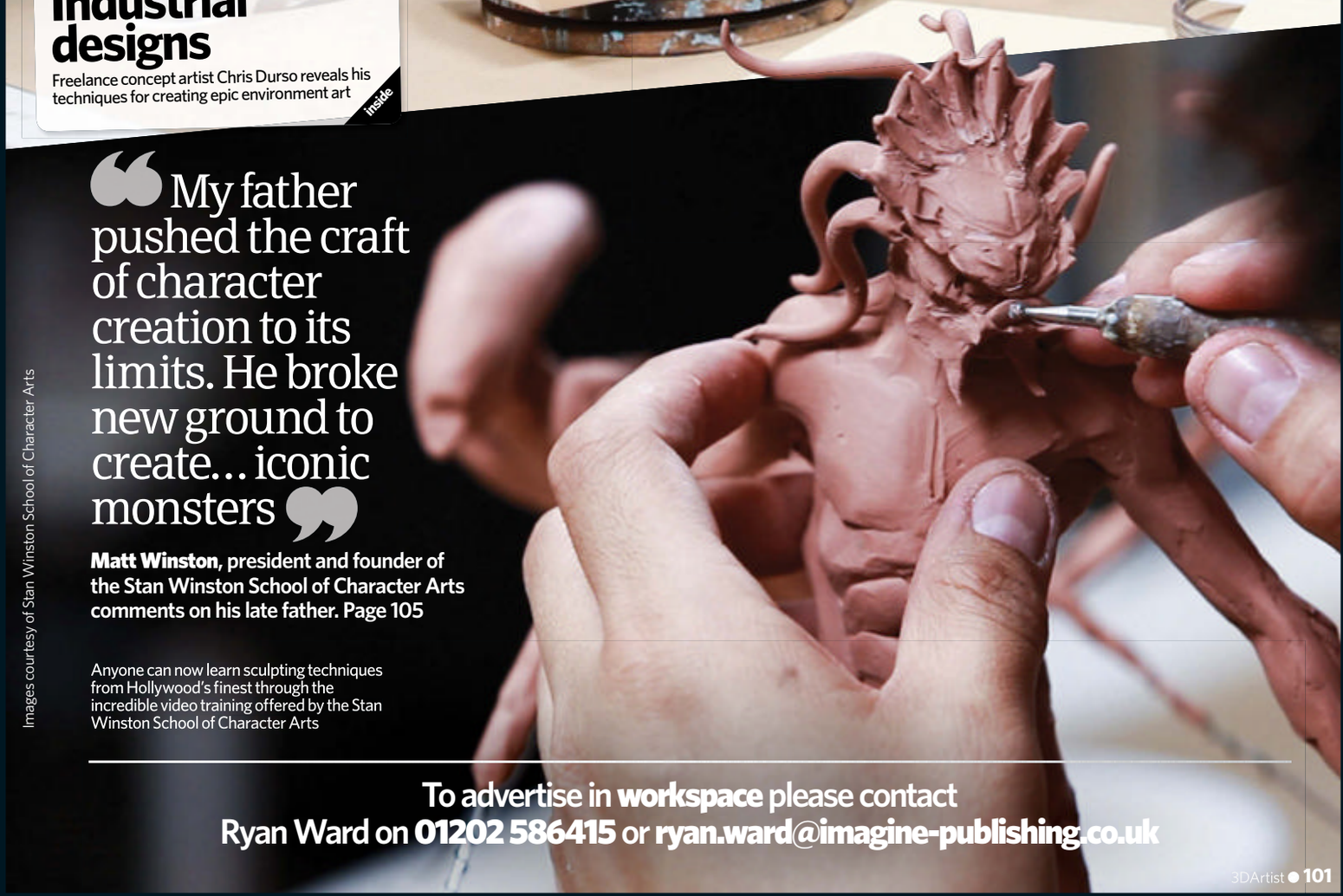
102 News
Industry news
Stay atop of the latest developments and software releases with our highlights

105 Course focus
Sculpt dynamic characters
Learn traditional sculpting skills from real Hollywood practitioners in this video course

106 Project focus
'Sang d'Encre'
We talk fluid simulation with a group of French film students who created this impressive short

108 Industry insider
Industrial designs
Freelance concept artist Chris Durso reveals his techniques for creating epic environment art

inside



> "My father pushed the craft of character creation to its limits. He broke new ground to create… iconic monsters"

Matt Winston, president and founder of the Stan Winston School of Character Arts comments on his late father. Page 105

Anyone can now learn sculpting techniques from Hollywood's finest through the incredible video training offered by the Stan Winston School of Character Arts

Images courtesy of Stan Winston School of Character Arts

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The streamlined modelling and rendering process provided by the new Caustic boards and Caustic Visualizer will be entirely beneficial to artists working to tight and strict deadlines

Model courtesy of Pacific Digital Image Visual Studios, www.pacdigital.com

The Caustic Series2 OpenRL family

Get maximum performance from Caustic Visualizer with the Caustic Series2 ray-tracing-accelerator boards

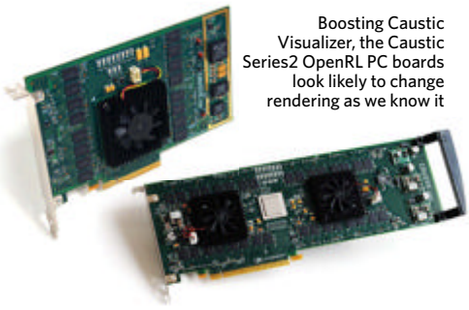
Imagination Technologies has announced the availability of its Caustic Series2 OpenRL PC boards, which accelerate the Caustic Visualizer plug-ins for Maya and 3ds Max.

The Caustic R2500 OpenRL PC and Caustic R2100 boards are the first in a family of high-performance ray-tracing-accelerator PC boards using Imagination's unique ray-tracing technology. They enable the Caustic Visualizer photorealistic viewport plug-in to provide a far higher visual quality than 3ds Max and Maya's normal rendering viewports. These include globally accurate lighting, reflections and shadows within a 3ds Max, Maya or mental ray scene. This enables you to identify and resolve potential problems early on in final rendering, minimising the need for preview renders and therefore radically streamlining the development process.

The Caustic R2500 OpenRL PC board is priced at $1,495 US, targeting the latest high-end machines. The Caustic R2100 board will be priced at an incredibly low $795 US, intended for upgrading a wider scope of mid-range and higher workstations. Both boards ship with a copy of Caustic Visualizer, which is otherwise priced at $299 for a standalone version. Head to www.caustic.com for more info.

Could this be the future of rendering?

Using the Caustic Series2 boards in conjunction with the Caustic Visualizer on 3ds Max and Maya produces impressive results. The Caustic Visualizer viewport renderer interactively updates and responds to all edits, including geometry, lighting and shading characteristics. Selected objects in the Maya viewport, meanwhile, continue to have fully editable wireframes and manipulators overlaid on the real-time, ray-traced preview.



Boosting Caustic Visualizer, the Caustic Series2 OpenRL PC boards look likely to change rendering as we know it

"Opinion"

ZBrush 4R5 now available

Pixologic releases another major update to its incredible sculpting package

ZBrush 4R5 introduces a host of enhancements for better workflow.

Panel Loops enable users to convert PolyGroups into panels with an editable custom bevel, ready for extrusion. This could be used to create instant armour, for example.

The new Polish by Feature option "intelligently improves your mesh's shape without sacrificing volume", but one of the most interesting new topology options is Delete Loops. This auto-removes all edge loops that don't contribute to a model's shape for a given angle setting. This is a way of streamlining geometry and, as Pixologic notes, "can be an interesting way to explore alternate designs by producing original models derived from the original polygon structure."

A new Posterize option has also been included. Effectively cel-shading, apply the effect directly to the model in 3D, or as a 2D effect during rendering.

Several smaller elements in the mix include Quick Saves, with the option to auto-save after a period of time, while a new semi-transparent See-Through Mode for the GUI enables you to check reference images without having to switch windows. ZBrush 4R5 is free to existing users, or $699 US to new customers. Visit www.pixologic.com.

The new Dynamic Brush Size option automatically adjusts brush size according to the distance between the model and the camera – the further you zoom in, the smaller the details you create

● **HAVE YOU HEARD?** • Autodesk's Marc Petit stepped down after a decade as senior VP for Media & Entertainment

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To feature in workspace3D please contact Chris McMahon on 01202 586239 or chris.mcmahon@imagine-publishing.co.uk

Flame Extension 2

Autodesk extends its VFX software with new enhancements & improvements

Autodesk has announced the latest extension release for its Flame 2013 20th Anniversary Edition software. Named Extension 2, the update includes new features and performance enhancements based on feedback from the community. Key features include support for Apple ProRes and 16-bit DPX workflows, Clip Reveal and Clip Protect tools, accelerated browsing in MediaHub and improved management of memory.

"A few standout elements for me [are the] desktop improvements and fixes [that] will make the Flame crowd draw a large breath and sigh of relief," says Chris Noellert, creative director and VFX supervisor at Carbon VFX and long-time beta customer for Flame. "Most – if not all – of the usability has returned and much of the annoying GUI strangeness has been wiped away... This release is really about stability – as well as a fair amount of spit and polish."

"Conforming and file handling seems to be improved a bit and libraries appear to have made a comeback that will definitely make some people happy," says Noellert

Autodesk Flame 20th Anniversary Edition Extension 2 is available to current users with subscriptions. Find out more at http://autodesk.com/flame.

Ang Lee honoured

Life of Pi director recognised for his work of art

Internationally acclaimed director Ang Lee is to be honoured with the International 3D Society's Harold Lloyd award, the institution's highest recognition for a filmmaker. The award will be presented at the society's annual Creative Arts Awards in February. "Harold Lloyd was a lifelong advocate of 3D movies, but the technology available to him could never bring this dream to life," said Jim Chabin, president of the Society. "In joining our previous honourees, James Cameron and Martin Scorsese, Mr. Lee has realised that dream and has produced an extraordinary work of art with *Life of Pi*."

"With *Life of Pi*, [director Ang Lee] has produced an exquisite, enlightened and exciting... achievement that ranks as one of the finest artistic works captured in 3D," says Suzanne Lloyd, chairman of Harold Lloyd Entertainment

Unity ruled 2012

Unity prevails in Apple's App Store Best of 2012 list

Game Of The Year winner *The Room* was critically lauded across the internet. Graphically, it shows what the Unity engine is capable of – even on iOS devices

Unity Technologies found no less than 17 games created using its multi-platform engine and development tools honoured in Apple's App Store Best of 2012 list last year, including Game of the Year for Fireproof Games' *The Room*. Other Unity-created games awarded included *Mini Motor Racing* and *Bad Piggies* for Best Casual Games, *CSR Racing* for Best Free-to-Play Game, *Triple Town* for Best Hidden Gem and *Kingdoms of Camelot: Battle for the North* for Top-Grossing App of the year on iPhone.

Software shorts

Bringing you the lowdown on product updates and launches

Bitmap2Material 2.0

Allegorithmic has released Bitmap2Material 2.0 – an update to the normal-mapping toolkit the developer once described as "like CrazyBump on steroids". The update offers more control over Diffuse maps, improvements to the AO map-extraction, Normal map-extraction and light-cancelling algorithms. Bitmap2Material 2.0 is compatible with 3ds Max, Maya, Flame and Unity and is $149 US. You can purchase it at www.allegorithmic.com.

Ornatrix 2

Ephere has released a significant update to its 3ds Max hair simulation plug-in, Ornatrix. Version 2 adds full support for V-Ray, including GI, soft and area shaders, as well as support for V-Ray's hair shaders and motion blur. The update also introduces full support for the MassFX dynamics system recently upgraded in 3ds Max 2013. Ornatrix 2 is available for 3ds Max 2009 and above for $499 US. Those with a licence can upgrade for free. Learn more at www.ephere.com.

Blender 2.65

The latest update to Blender's open-source 3D package has been released, offering more than 200 bug fixes and improvements. Highlights include new fire simulations and improvements to the smoke simulator, support for custom shaders such as the Imageworks-developer's Open Shading Language, a reworked Bevel tool, a new Symmetrize tool and much more. You can download a copy of Blender 2.65 for free or upgrade at www.blender.org.

Simplifying motion

A new tool for motion-graphics artists

Motion-graphics design is a prominent part of the CG industry – simply check out the opening credit sequence of *Skyfall* for a truly stunning example

Maxon has released ArtSmart, a new plug-in for handling artwork from Illustrator or PDF files within CINEMA 4D. The software is aimed at the motion-graphics field, providing options for adjusting the Z offset between paths in an Illustrator file, as well as adjusting caps and fillets. The tool can automatically generate materials for individual fill colours within each layer. Users of CINEMA 4D's Broadcast or Studio editions can also apply MoGraph Effectors to each layer. The tool is free to anyone with a Cineversity account. Head over to **www.cineversity.com** to learn more.

DID YOU KNOW? ▪ *Despicable Me*'s producer John Cohen is to work on the upcoming *Angry Birds* movie, due 2016

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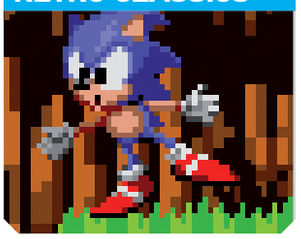

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Course Focus

Sculpt dynamic characters

Learn traditional creature-sculpting techniques from the industry's finest

Course name
Sculpture Techniques – How To Sculpt Dynamic Characters

Course length 3 hours

Fees Video stream: $20 US. DVD version: $70 US for non-subscribers or $50 US for subscribers

Student requirements None

Website
www.stanwinstonschool.com

If you enjoy watching movies then there's little doubt you've enjoyed the work of the late Stan Winston. His creative vision can be seen in the creatures, aliens and robots of *Predator, Aliens, Jurassic Park, The Terminator, Iron Man, Avatar* and a great deal more.

"My father pushed the craft of character-creation to its limits. He broke new ground by using every possible practical or digital approach to create iconic monsters," says Matt Winston, president and founder of the Stan Winston School of Creature Arts and son of the man himself. "We – the Winston family – founded the Stan Winston School of Creature Arts out of grief over our loss. We were looking for a way to keep his fun, creative spirit in our everyday lives..."

The school teaches a broad range of creature-creation techniques via pre-recorded tutorials delivered by working professionals at the top of their field. One such professional is Simon Lee, who teaches the school's successful Sculpture Techniques – How To Sculpt Dynamic Characters course.

If you're interested in the digital side of things, Stan Winston School also caters to that. "We offer training videos in literally every facet of character-creation, from practical FX to digital approaches, from traditional to cutting-edge. We cover pencil design, Photoshop, ZBrush, painting, fabrication, hair work, model-making, animatronics, rod puppetry – just to name a few!"

Head over to http://tinyurl.com/3DAStanWinston to read our full interview with Matt Winston. For more information visit www.stanwinstonschool.com and find a course that suits you.

> "Simon Lee is in a category all by himself. His sense of drama and raw power make him the Frazetta of sculpting"
>
> **Guillermo del Toro,** director of Pacific Rim

The tutor

Simon Lee

Lee started out building websites before deciding to turn his childhood hobby of sculpting into a business. In 2008 he started releasing his original-design model kits under the online alias Spiderzero and within three years he had built up a sizeable global fan base. In early 2011, Lee challenged himself to design and sculpt 20 monster sculptures in 20 days, branding the event Spiderzero's 20 Days of Monsters. In March 2011, Lee was hired by Guillermo del Toro to work on the concept design for the movie *Pacific Rim*. Since then Lee has contributed to film projects from Warner Brothers, Disney and Fox.

A "We shoot our lessons inside the world's premier effects facilities, right alongside the characters they're creating for the next Hollywood Blockbuster," says Winston

B The school has 80-per-cent practical versus 20-per-cent digital training. However, the ratio is fluid, with new lessons always being added to the library of tutorials

C To fully follow this tutorial you'll require a number of sculpting tools, including various types of armature wire, a small blowtorch, cutters and various other implements

D The lessons are designed to apply to both the novice sculptor and the seasoned pro, offering a selection of tips and tricks that can help get you started or refine your style

E Even if you're a digital sculptor by trade, traditional sculpting can still give you better insight into elements that can apply to both mediums, such as understanding anatomy

Images courtesy of Stan Winston School of Character Arts

Project Focus

'Sang d'Encre'

An imaginative short that demonstrates how emotional resonance can often be as challenging to achieve as complex fluid simulation

Project 'Sang d'Encre'
Description Created by three students as their end-of-studies film at Bellecour Ecoles d'Art and produced in just over a year, 'Sang d'Encre' tells the story of a poet and his muse, represented here as a woman made out of ink. The students were inspired by romantic poets such as Baudelaire in the creation of this short.
Website
www.sangdencre-themovie.blogspot.fr
Country France
Software used 3ds Max, mental ray, RealFlow, Photoshop, After Effects, Premier Pro

The directors

Tom Gouill
Mélanie Tournois
Jeoffrey Lavanche

If you want a shining example of just how advanced student work can be, then look no further than 'Sang d'Encre' (translation: 'Ink Blood'). Both an artistic and technical achievement, the five-minute short chronicles one night's experience of an author suffering writer's block. When his inspiration finally comes it's in the dreamlike form of incredibly impressive fluid simulations, the ink of his pen swirling and shifting into a variety of smooth, jet-black configurations.

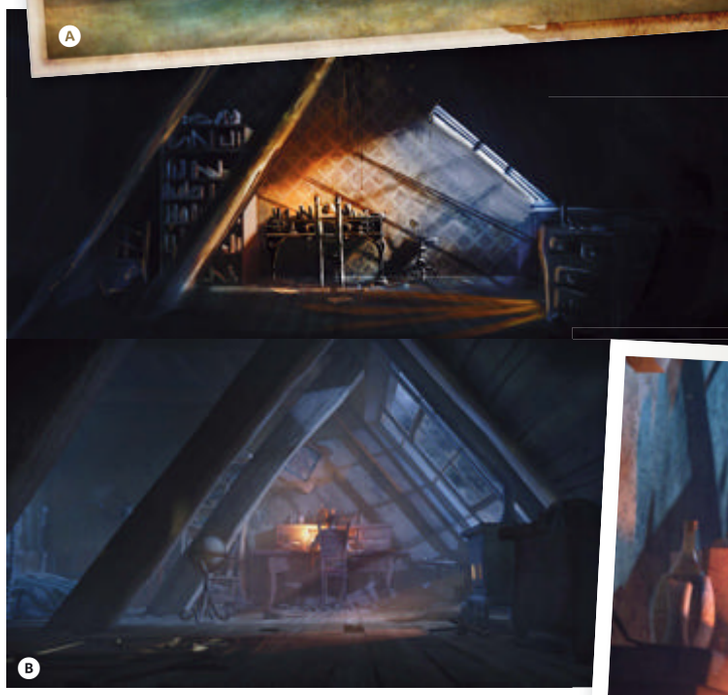
"We wanted the story to focus on what writing and inspiration represented to the main character," explains the film's co-creator Tom Gouill. "His writing represents his life and the short explores what would happen if he lost his inspiration and couldn't write. To get it back he must sink into his turmoil. It was important for us to show the way he indulges in his misery."

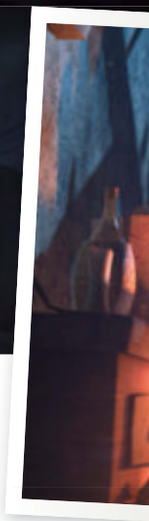
Given that there were just three students working on the short, its creation was no easy task. The incredibly impressive – not to mention beautiful – fluid simulations that make up the second half of the film were particularly tasking, given that Gouill had to learn RealFlow from scratch to create them.

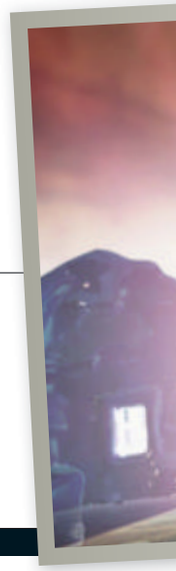
"[The fluid simulations were] the biggest technical challenge for us, because none of us had ever experienced RealFlow," Gouill elaborates. "I learned to use it gradually. It was difficult to avoid ending up with ink that acted too thick, because even if ink has the same density and physical reaction as water, in the film it's not always subject to the normal conditions of gravity, with the formation changing according to the Muse's movement."

The fluid simulation is nevertheless impressive, with the Calliope-like character warping and morphing with the kind of skill you would expect from a seasoned RealFlow user. However, more-traditional animations featuring throughout the film are no less impressive.

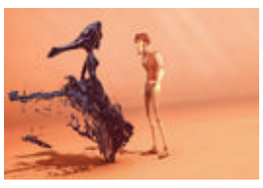
"We approached the animation by asking ourselves what the characters would think or feel at any moment. It wasn't very easy because we wanted the poet character to be very passive, contemplative and admiring of his muse," says Gouill. "We also filmed





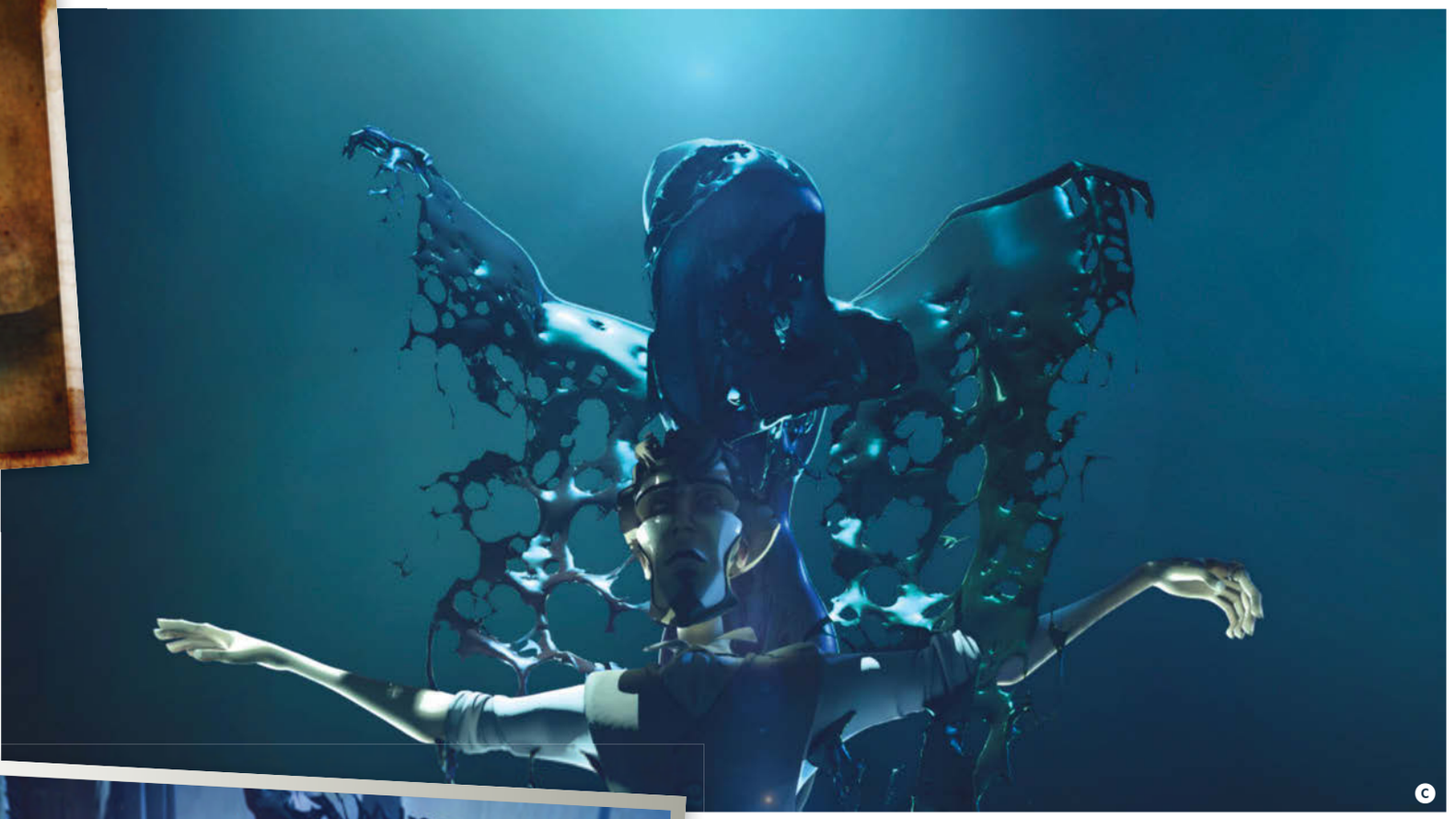


> We wanted to make a contemplative film that makes you really feel something **Tom Gouill,** co-creator



A Inspirations for the short were rife, from the poems of Baudelaire to Tim Burton's movies, Disney's *Fantasia* and 'The Tales Of Three Brothers': an animation short that features in the blockbuster *Harry Potter and the Deathly Hallows Part 1*

B In order to keep consistency in both colour and lighting, Tom would light a shot of each environment immediately. This helped form an idea of the overall look and feeling the team wanted to achieve for the final composition



C

D

E

an actor named Lucas Fernandez playing out all of the film shots several times, which would sometimes bring us new ideas when animating the main character. We feel we managed to keep a sense of coherence throughout the film, with the character of the poet remaining consistent in his actions from beginning to end."

Lighting was another aspect the team wanted to keep focused throughout the short. "It was important for us to capture a sense of character in the lighting; something credible but also with a sense of the fantastical about it," explains Gouill. "We analysed a lot of pictures that emphasise chiaroscuro, particularly for the first part of the film.

"To speak more technically, however, we used standard and photometric lights and decided to render a pass per light," he continues. "That meant we were free at the compositing stage to retouch each light, and each detail, separately and easily. The only trouble with this technique is that it takes a lot of time and organisation. In the end, however, it makes compositing much more simple."

Gouill and the team don't necessarily want the viewer to concentrate on the technical aspects of the short, though, no matter how impressive they may be. They prefer focus to be on its emotional side – which was even more difficult to get just right. "The real challenge wasn't technical," says Gouill. "It was more difficult to put the story on the screen, because we wanted to make a film with different reading levels and a lot of meanings and symbols. We wanted to make a contemplative film that makes you really feel something."

C When working with complex fluid simulations, Gouill suggests that artists must carefully monitor the unit scale and frame rate. For 'Sang d'Encre', the team had to get the consistency of the ink fluid just right to portray the character of the Muse

D "For the animation we used an interface created by a friend in our class – Yann Moriaud," says Gouill. "Jeoffrey (Lavanche, co-creator on the short) adapted it to our characters and that enabled us to animate more efficiently"

E The team aimed to create something musical, so they first worked out the choreography for the dream sections in 2D. Once the choreography was keyed into the music's rhythm, the team began the 3D stage and fleshed out the sequences

Industry insider

Industrial designs

Freelance concept artist

We talk to Halo 4 artist Chris Durso about the evolving nature of environment art

About the insider

Job Freelance concept artist, formerly environment and lighting artist at 343 Industries
Education Major in Animation, Minor in Industrial Design
Location US
Website www.chrisdurso.com
Biography Chris Durso is a Seattle-born artist working in the entertainment industry. He's currently a freelance concept artist, though he was recently employed at 343 Industries as an environment and lighting artist. His current role has seen him take on multiple roles and disciplines, from modelling and texturing to environment-creation, lighting, sculpting and concepting.

Halo 4 is one beautiful game. Taking place on a world of desert canyons, lush jungles and gleaming alien machinery, there's plenty of variety with which to show off the hard work of the 343 Industries artists. One level might see you picking your way through the metallic innards of a crashing UNSC spaceship, another might see you darting between floating Forerunner artefacts – no matter what you're doing, it looks absolutely fantastic. The lighting and rendering capabilities on show by far surpass the less impressive visuals of *Halo* games now past.

Unsurprisingly, achieving such an exceptional level of graphical fidelity was no easy task for the team. "*Halo 4* demanded a very high level of technical skill and design sense. In many ways I was expected to be my own concept artist," says Chris Durso, environment and lighting artist on the title. "I think the biggest thing when working on a game such as this is really paying attention to the design elements. There is definitely a design language that is unique throughout the game and the single-player's various environments, whether they are UNSC, Forerunner or Covenant. All of these environments have their own rules and requirements and these [had to] be abided to." We talk to Durso to discover just how complex a task this can be – especially with today's technical advancements.

How do you go about devising genuinely new and original environment designs?
Good design is the heart and soul of any work of art, whether it's the gesture and balance of a character model or the way an environment or prop is put together. That said, the way I go about art and specifically environments has changed much over the years. I used to have the mindset that things were done in a particular order: modelling, texturing then lighting. Now I try to cut as many corners as possible and allow myself to fail right away, because if I fail sooner in an environment then I can always correct and arrive at a better end result. I also try to get my lighting and mood blocked in as soon as possible. By establishing lighting early on I can cut a lot of corners in modelling and texturing and use light to lead my eye and create better compositions. I approach environments very much like paintings in that sense. I don't feel the need to model details in shadows or where they don't make sense. I only tend to use detail where it works in terms of design and functionality and where I want the focus to be. I adopted this technique after working with other amazing environment artists over the years, like David Lesperance.

How has the discipline of environment design and modelling changed over the time you've been involved in it?
I think, as the grip of technical limitations lessens, we're able to get more creative. When I started out I generally never made things high-poly or sculpted anything. [We] painted and faked a lot of information in diffuse maps or textures. I think it's quite the opposite now, where you generally want to model things for your textures and diffuse maps are very plain. I also think the more that technology advances, the more skill is

Halo 4 images ©Microsoft Studios, courtesy of 343 Industries

Halo 4 images ©Microsoft Studios, courtesy of 343 Industries

Portfolio highlights

Some of the recent videogames Durso has worked on include:

2012 *Halo 4*
2011 *SOCOM 4: U.S. Navy SEALs*
2010 *MAG*

Although the mech in this image was created by Dan Sarkar, Durso created the lighting and effects. It demonstrates how atmospheric a game *Halo 4* really is

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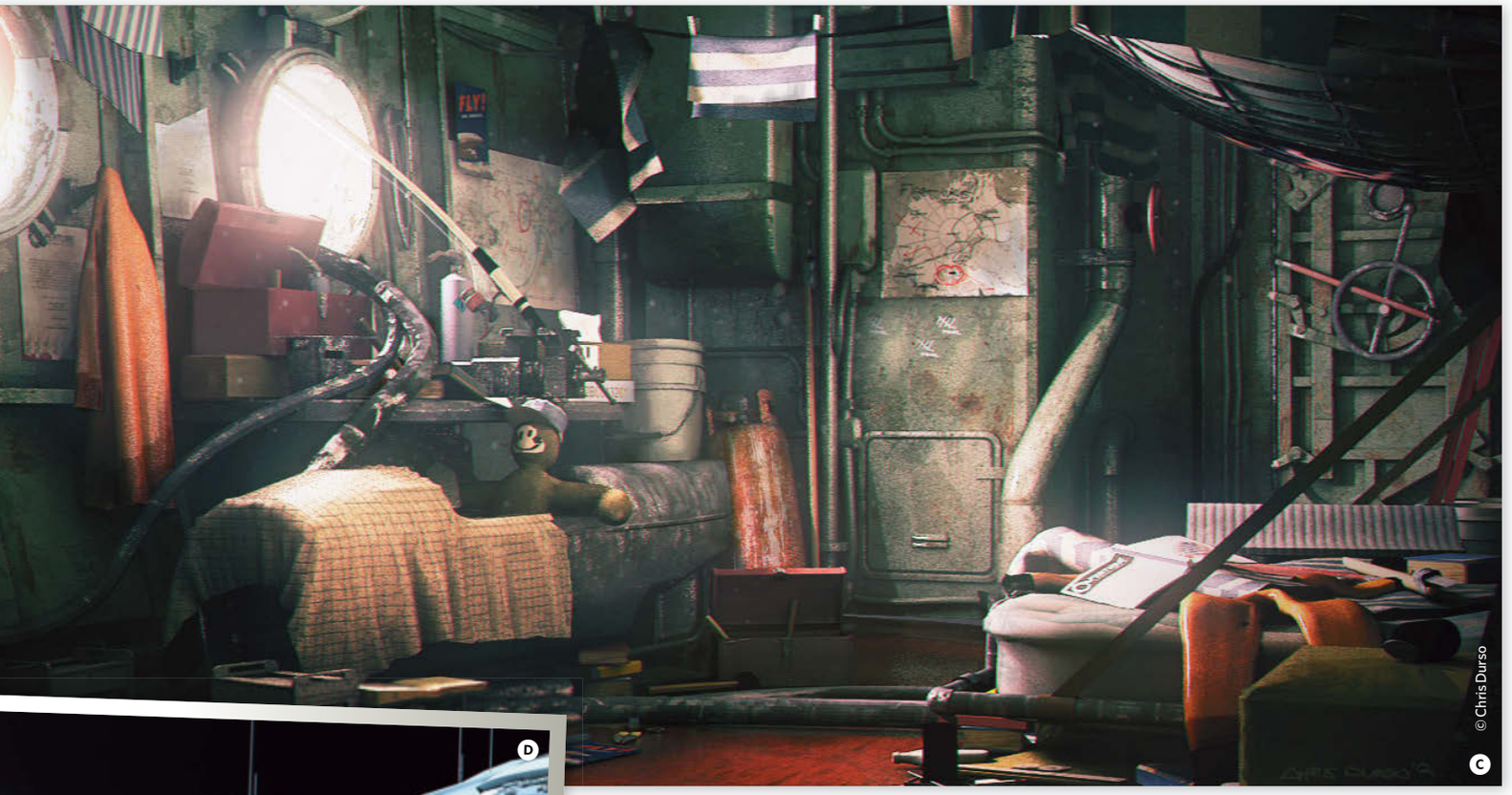

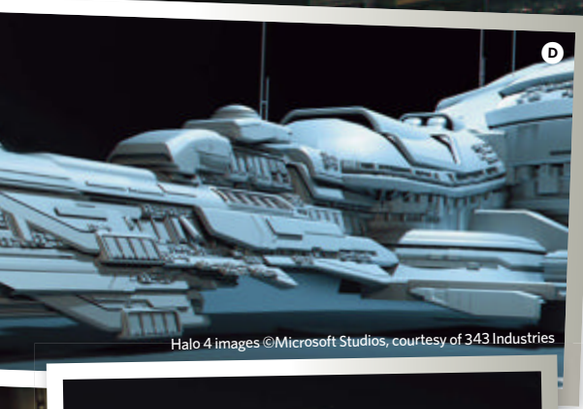

A symbiotic relationship

According to Durso, environment concepts and level design rarely come to heads

"I sat right next to everyone else working on my *Halo 4* missions, including the level designer, which made communication incredibly easy. Also, I was lucky enough to have worked with a very good level designer who could work around my design and artistic choices. This allowed me the freedom to make the decisions I wanted when creating an environment. Generally speaking, gameplay and design are constantly being tested day in and day out, so because of this I think we were able to avoid many of the problems that might have come up."

required of the artist. A normal prop five years ago took me a few hours to make, now it could take an entire week depending on the complexity of the modelling and design.

What advice would you give to others looking to become environment artists? How can they get into the industry?

As always, hard work and passion. Aside from that, I try to study and think more like a concept artist and less like a 3D guy. The tools don't matter, but a strong foundation and understanding of composition, lighting, design, form… are the things that do. Also, make friends with other artists – especially ones that are better than you. I owe much of what I know to having so many amazingly talented friends. Guys like Josh Kao, Tom Scholes, Nathan Campbell, Dave Bolton, David Lesperance, Paul Pepera (one of my mission leads) and others have taught me so much and I greatly value those relationships.

> "By establishing lighting early on I can cut a lot of corners… and use light to lead my eye and create better compositions"

A Durso makes sure he picks the best tools to apply when building his environments: "I use different software depending on what the task involves," he says

B When working on *Halo 4*, Durso found that he had to be his own concept artist, coming up with exciting ideas for spaces and then building them out using 3D software

C In concept art, creating environments isn't far removed from building characters. You need to infuse them with personality, style and originality

D "Working on *Halo 4* was quite an experience," says Durso. "I was overwhelmed that I was working with so many of my heroes and people who I have admired"

E While props would only take a few hours to create a few years ago, today technology and attention to detail can see even a small crate like this taking days to finish

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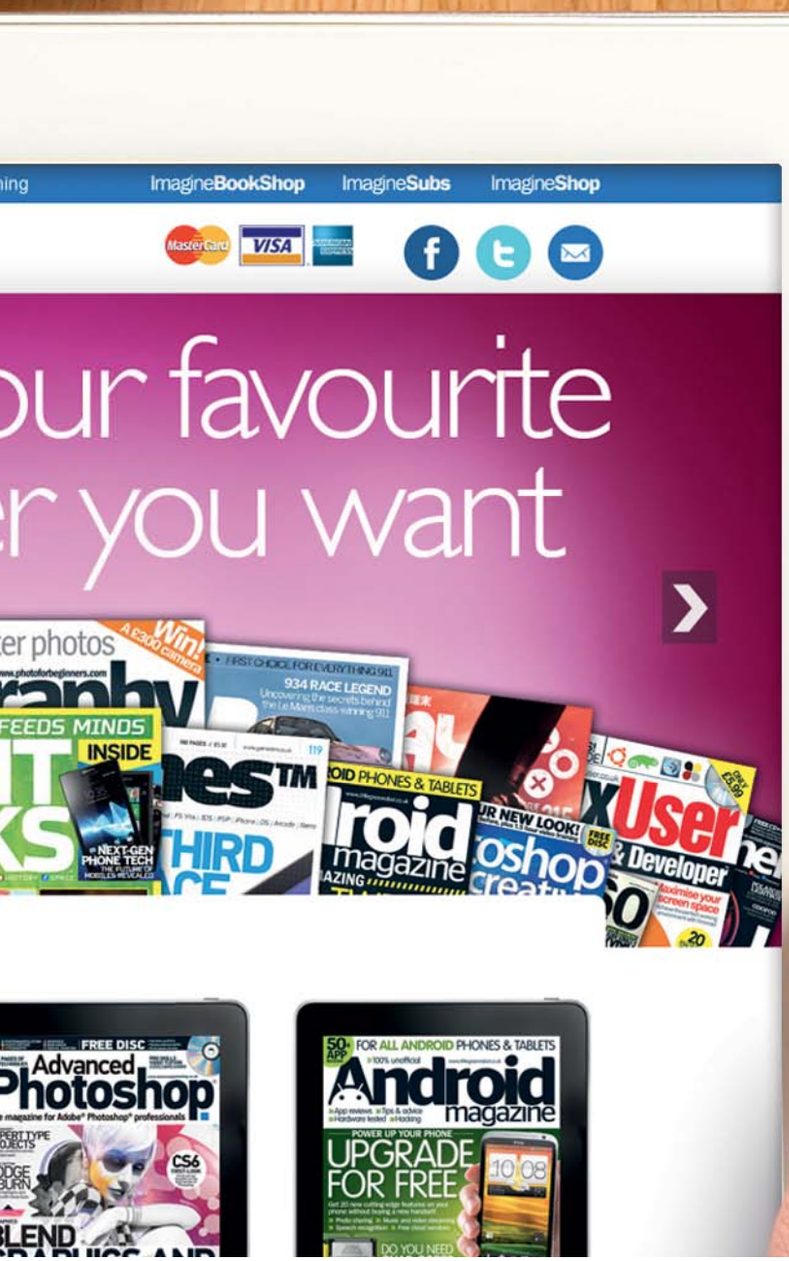

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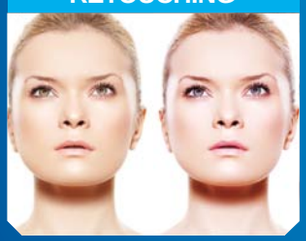			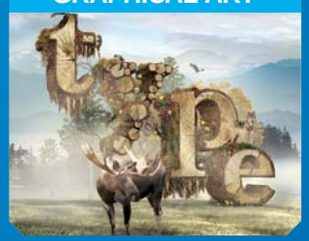	

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UNLEASH YOUR IMAGINATION

Bruce Heinlein

Q: Did you have any 3D software experience before coming to the DAVE School?
A: No, not at all. My background was mostly graphic design.

Q: How has your experience at the DAVE School been so far?
A: It has been great, I have learned so much in such a short period, it has also opened up a whole new level of possibilities for my creative side.

Q: Tell me about this Model?
A: This was created in less than a week. It was our second week project.

Q: Wow! Did you think that you would be able to create something like this in your second week of school?
A: Absolutely not! When the instructor showed us the reference material, my jaw dropped! I'm glad that I decided to come to the DAVE School, and look forward to what I can do next.

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